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Environment and Conservation

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# **Biodiversity values of unallocated Crown land on Cape Range peninsula, Western Australia**

Prepared by

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Frontispiece: View from the top of Cape Range looking westward towards Ningaloo Reef, with Tantabiddi Creek on the right.

**BIODIVERSITY VALUES OF UNALLOCATED CROWN LAND ON CAPE RANGE PENINSULA, WESTERN AUSTRALIA**

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## **EXECUTIVE SUMMARY**

The Cape Range peninsula is a region of high local, regional and international significance. The peninsula consists of a heavily dissected limestone range bordered by the Ningaloo reef, covered by a large area of unallocated Crown land and four conservation parks, Cape Range National Park, Ningaloo Marine Park, Jurabi and Bundegi Coastal Parks. The peninsula is dominated by Cape Range, a limestone range composed of Tertiary limestone. Formed within the limestone is an extensive karst systems with over 500 caves recorded. These caves are home to many endemic stygofauna and troglifauna taxa. The aim of this report is to describe the natural values of the unallocated Crown land on Cape Range peninsula and establish their relative conservation values.

There are three broad vegetation types within the UCL; limestone hills and ranges, vegetation on the coastal plain and vegetation on the red sand dunes (Beard 1975). The northern red sand dunes are not represented within the conservation estate. The Cape Range peninsula is home to many endemic flora with a total of 19 priority taxa recorded from the north west of the peninsula. A total of 270 taxa have been recorded within the UCL with 12 taxa found exclusively within the northern red sand dunes.

A total of 70 reptiles have been recorded from the UCL, with three conservation taxa. In addition, new taxa have been identified that occur within the UCL. Unlike the reptile fauna, there are no endemic mammals recorded from the Cape Range peninsula. A total of 15 mammal taxa have been recorded from the UCL with four introduced species. Five bats have been recorded from the peninsula (Kendrick 1993) but only two have been recorded within the UCL. Both bats were recorded from Padjari Manu cave, one of the few caves on the western side of the range in the UCL.

Only 37 birds have been recorded within the UCL compared to nearly 200 birds that have been recorded on the Cape Range peninsula (Birds Australia 2010). Several bird populations on the Cape Range peninsula show differences in morphology from the inland Pilbara-Gascoyne populations.

The stygofauna and troglofauna of the Cape Range peninsula are unique and mostly endemic to the region. *Milyeringa veritas* and *Ophisternon candidum* have been recorded from within the UCL and are restricted to the freshwater and anchialine ecosystems on the coastal plain of Cape Range, Barrow Island and selected calcareous aquifers on the Pilbara mainland.

## BACKGROUND

The Cape Range peninsula is a region of high local, regional and international significance. The peninsula consists of a heavily dissected limestone range bordered by the Ningaloo reef. The peninsula has a single national park, Cape Range National Park (CRNP), that is bordered by Unallocated Crown land (UCL) and pastoral leases. Other conservation reserves on or in the vicinity of the peninsula include Ningaloo Marine Park, Muiron Islands Marine Management Area and the Jurabi and Bundegi Coastal Parks. Much of the peninsula is on the National Heritage List and the CRNP, Ningaloo Marine Park, Muiron Islands Marine Management Area and the Jurabi and Bundegi Coastal Parks are on the World Heritage List. Both the National and the World Heritage listing invoke the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act).

The benchmark reservation level for a CAR (comprehensive, adequate and representative) reserve system is generally acknowledged as 15% of each bioregion (CALM 2003). The area of reserved conservation land in the Carnarvon bioregion is 302,536 ha, or 3.59%. This level of reservation is well under the recommended level of reservation to fulfil State and Commonwealth obligation to a CAR National Reserve System (NRS) and reinforces the need for additions to the conservation reserve system in the bioregion. Such a low reservation value also strengthens the case for complementary off-reserve reservation initiatives such as Indigenous Protected Areas, conservation covenants and land use agreements.

In 1974, the Conservation Through Reserves Committee (CTRC) recommended to the Environmental Protection Agency (EPA) that the CRNP be expanded to include important features that would be more representative of the northern, western and eastern coastal areas. This was approved by the EPA and endorsed by Cabinet in 1975. Initial recommendations from EPA in 1975 for proposed additions to the national park included the UCL to the north, south and east of the park, but not all of the UCL on the northern peninsula.

The Cape Range National Park Management Plan (Department of Conservation and Land Management 1987) recommended assessing the land north of CRNP for inclusion in the national park as part of the review of the management plan and proposed investigations be undertaken into the conservation (and other land use) values and management options of/for these areas. Following this management plan, the Western Australian Planning Committee (WAPC 1998) made recommendations for the extension of Cape Range National Park to include the areas east and south of Cape Range National Park as outlined in the 1987 management plan (Department of Conservation and Land Management 1987), with the exception of land within the proposed reserve for ‘conservation and limestone resource management’; and the area to the east outlined by the EPA in 1975, to but not including the scenic amenity corridor along Murat Road south of Shothole Canyon Road.

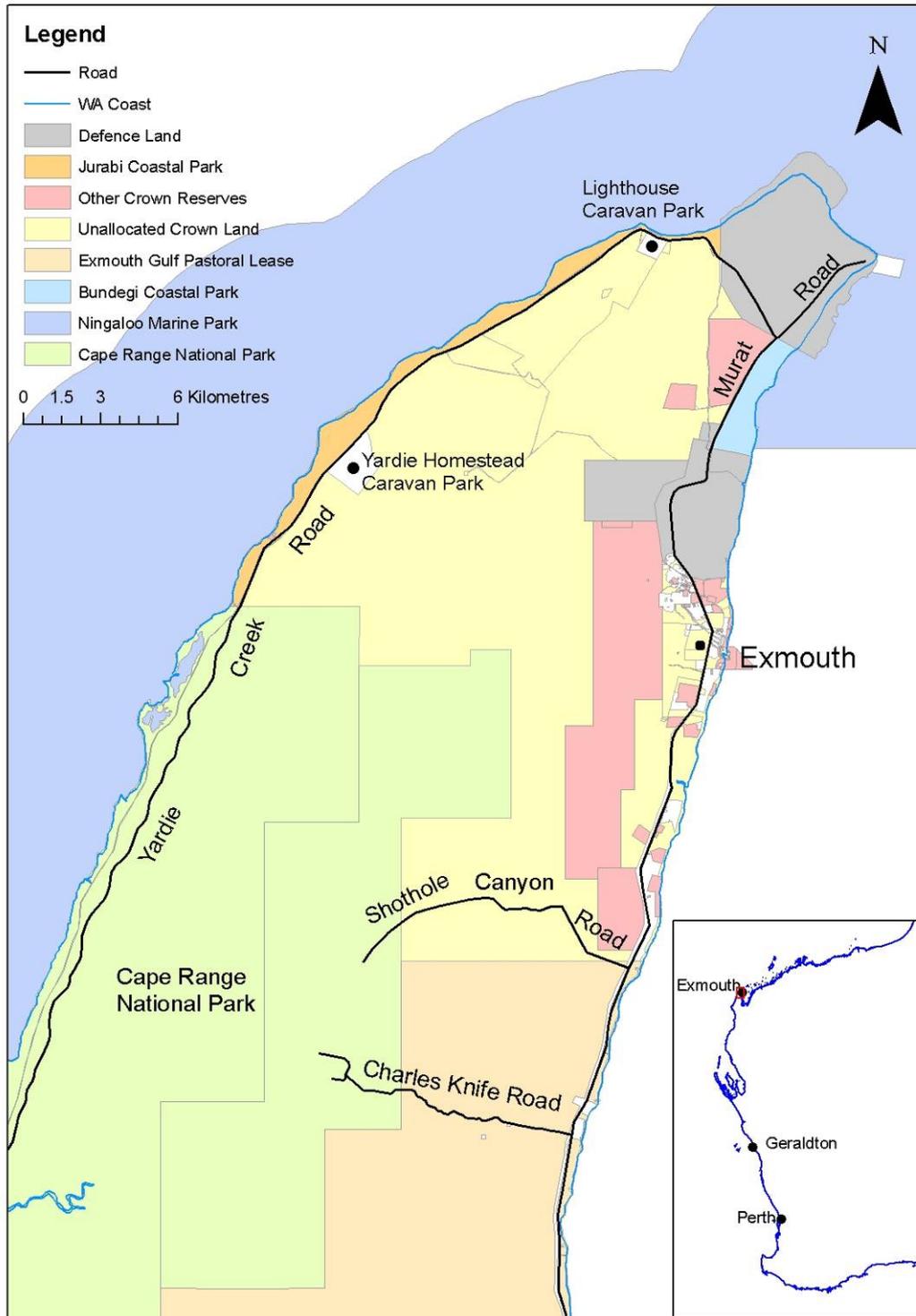
Further to WAPC (1998), the Ningaloo Coast Regional Strategy Carnarvon to Exmouth (WAPC 2004) identified some areas subject to previous recommendations regarding the conservation reserve system as ‘Proposed Conservation and Recreation Areas’. This included the area(s) of unallocated Crown land under consideration in this study. In addition to the strategy, the Department for Planning and Infrastructure (DPI) recognised the need for more detailed planning for some areas on Cape Range peninsula, including much of the unallocated Crown land, and in particular, that relative to the Exmouth townsite.

The current CRNP management plan (Department of Environment and Conservation 2010) concurs with the additional reservation and off-reserve conservation measures of the earlier CRNP management plan (Department of Conservation and Land Management 1987) and the regional strategy (WAPC 2004).

The aim of this report is to collate and summarise the biodiversity values of the UCL (Figure 1). The outcome of this report is to inform further planning for the UCL area by the Western Australian Planning Commission (WAPC) and the Conservation Commission of Western Australia. Management of the UCL will not be covered as a previous report has outlined a management framework for the UCL (Strategen 2009). The management framework provides an outline of existing management arrangements in place for the UCL area (set in legislation and policy).

## **LOCATION**

The UCL is located within the Shire of Exmouth on the tip of the Cape Range peninsula, a peninsula located 1,270 kilometres north of Perth (Figure 1) and encompasses an area of 20,763 ha. The peninsula is dominated by Cape Range, a 330 metre anticline of Miocene limestone running along the length of the peninsula, and bordered by Ningaloo Marine Park on the western coast and Exmouth Gulf on the east coast. CRNP is located to the south and east of the UCL. The Jurabi Coastal Park and Bundegi Coastal Park occur on the western and eastern side of the UCL, respectively. Exmouth is the major town servicing the area and has a population of 1,844 within the centre and 2,063 within the Shire (ABS 2006).



**Figure 1. The location of unallocated Crown land on Cape Range peninsula. The study area excludes the small area of UCL surrounding the town of Exmouth.**

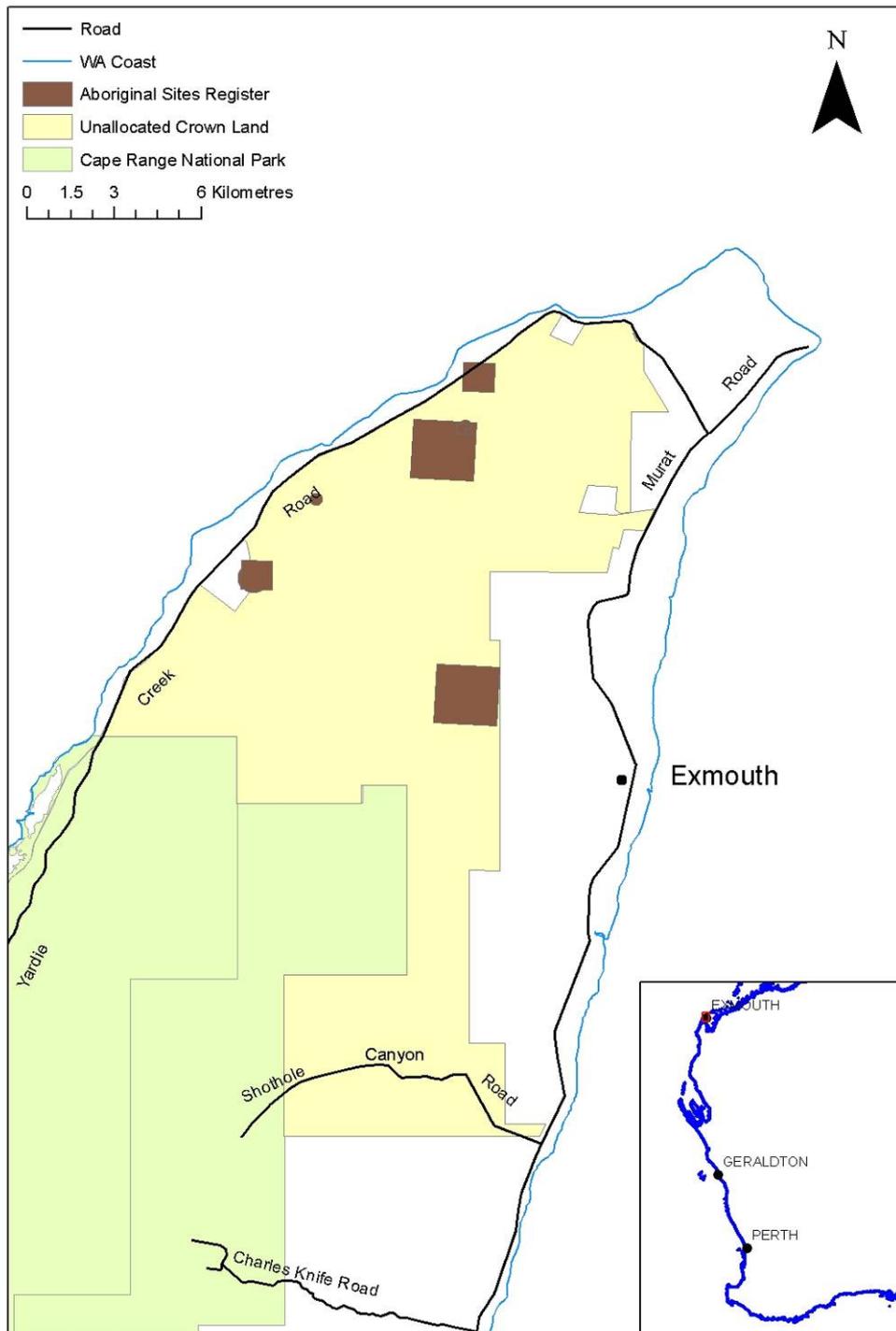
## **LAND USE HISTORY**

The Cape Range peninsula has a long history of occupation by aboriginal people, extending to 30,000 years ago (Morse 1993). Evidence of their continual occupation has been found within the range from caves and midden sites on the shoreline between Mangrove Bay and Yardie Creek (Morse 1993).

The first permanent European settlement was established by Thomas Carter, at Point Cloates in 1889. The first pastoral station, Yardie Creek, was established soon after from the western and northern parts of the peninsula, with sheep the main stock. The station went through several changes, with subdivision into several leases in 1907 and then parts re-amalgamated during 1933. The Yardie Creek Station lease reverted to the Crown in 1959 and subsequently became Unallocated (Vacant) Crown Land. Part of the UCL became gazetted as a reserve and subsequently became the CRNP in 1974, following several additions and amalgamations of reserves.

## **INDIGENOUS**

The Cape Range peninsula is part of the tribal territory of the Jinigudira (variously spelt) and Baiyungu (variously spelt) people (Tindale 1974). The area is currently encompassed within the claim of the Gnulli Native Title Claim group (WAD 6161/98 & WC97/28). There are nine registered sites on the Western Australian Aboriginal Sites Register within the UCL (Figure 2; Appendix 1). These sites include ceremonial, artefacts, burial, engraving, quarrying, grinding patches and rockshelters. In comparison, 49 sites, mainly midden sites, have been registered with the Aboriginal Sites Register within the CRNP. No midden sites occur within the UCL as the midden sites recorded on Cape Range are located closer to the coast (Morse 1993) and the UCL does not extend to the shoreline. Analysis of the midden sites date the occupation of Cape Range during the middle Holocene to modern times (Morse 1993).



**Figure 2. The location of Aboriginal Sites within the unallocated Crown Land. The locations and extents of 'open' sites are publicly available, whereas the locations and extents of restricted sites have been dithered within one or more 2km boxes in order to protect the site, and are not accurately represented within the public dataset.**

## **TOURISM**

Tourism is a major industry for the Exmouth area, with Ningaloo Marine Park and CRNP the major attractions. The national park attracts both international and interstate visitors, with 180,000 visitors to the greater Ningaloo coast region (Carnarvon to Exmouth) each year (Jones *et al.* 2009). Two caravan parks are surrounded by the UCL, Yardie Creek Caravan Park and the Lighthouse Caravan Park.

## **ACCESS THROUGH THE UCL**

There are three main sealed roads that provide access to the UCL, Yardie Creek Road, Shothole Canyon Road and, to a lesser extent, Murat Road. There are various unsealed tracks on the western coastal plains that generally reach the base of the range. A single unsealed road traverses the range and through the red sand dunes. This appears to be regularly used by locals and tourist operators. In addition, there are several unmarked tracks through the dunes and are likely to be used by locals and 4WD adventurers.

## **CLIMATE**

The Cape Range peninsula has a dry climate with hot summers and mild winters. It is classified as semi-desert bixeric, with two rainfall maxima during the year, with the main rainfall occurring from January to March (summer) and May to July (winter). (Beard 1975). The mean annual rainfall at Learmonth is 258.3 mm but there is considerable variation across the Cape and between years (121.7 mm 1<sup>st</sup> decile; 448.4 mm 9<sup>th</sup> decile; recorded 1945 to 2009).

Summer rainfall events are associated with thunderstorms and or the south eastward passage of tropical lows and cyclones while winter rainfall originate from tropical cloud bands in the northwest bringing heavy rains. Tropical cyclones affect the Cape about once every two years on average and result in strong winds, high seas and heavy rains (BOM 2010).

The highest maximum temperature at Learmonth occurs during summer, with January being the hottest month (mean maximum temperature 38.1 °C and a mean of 24.4

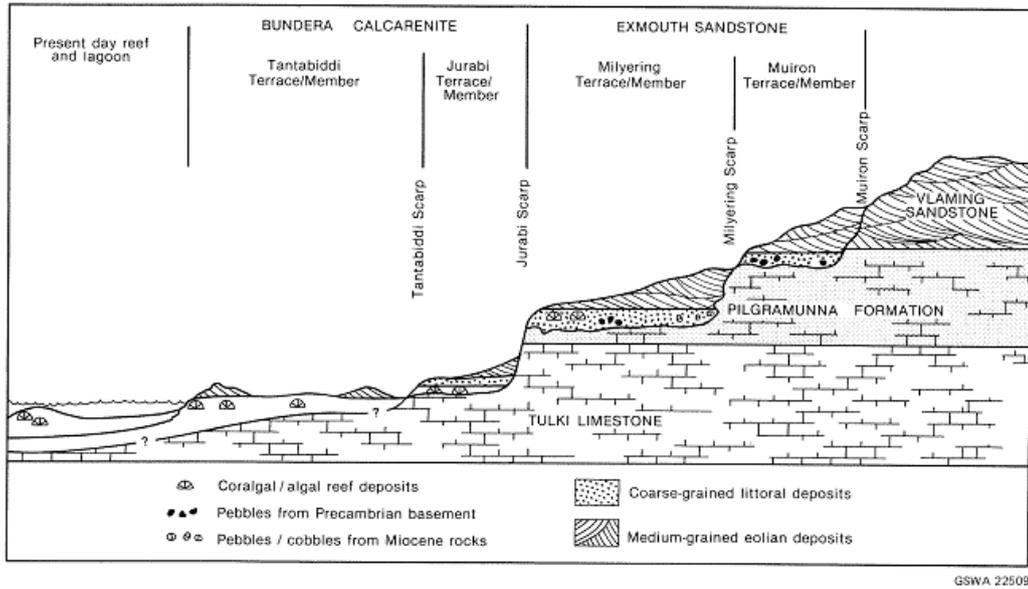
days above 35 °C). Further north on the peninsula temperature is moderated by coastal winds passing over the ocean (BOM 2010). Winters are mild with lowest mean maximum temperature recorded for July of 24.9 °C. Temperatures rarely fall below 2 °C in winter, with mean minimum of 11.4 °C in July.

## **GEOLOGY AND GEOMORPHOLOGY**

### **Geology**

The Cape Range peninsula is part of the Exmouth Sub-Basin of the larger Carnarvon Basin. It is composed predominately of carbonate rocks deposited from the late Oligocene to early Miocene (van de Graaf *et al.* 1982). The major units within the limestone, from oldest to youngest are: Mandu limestone; Tulki limestone; Trealla Limestone; and Pilgramunna Formation. The Vlamingh limestone is restricted to the western side of the range and conformably overlies the Pilgramunna formation and is an aeolian deposit associated with beach and subtidal deposits of the Pilgramunna formation.

The peninsula is dominated by Cape Range, an anticline that runs in a north south direction. The anticline is the result of folding and uplifting of the carbonate sediments approximately 15 mya by the underlying Cape Range fault 15 million years ago. The uplifting event is recorded by the presence of wave-cut erosion scarps and terrace and associated deposits on the west side of the range (Wyroll *et al.* 1993; Figure 3). The wave-cut platforms are present on the western side of the range and are well represented within the UCL. The platforms are incised into the Tulki Limestone and Pilgramunna Formation. Each platform records the uplift /sea level history of Cape Range, with its own shallow inshore and near shore deposits, namely the Exmouth Sandstone and Bundera Calcarenite. During the same period as the uplift and deposition, extensive dune and sandplains were deposited in the northern part of the peninsula, and the southern part of the Exmouth Gulf.



**Figure 3. The stratigraphic relationships of the main geological units on the west side of Cape Range. From Hocking *et al.* (1987).**

The range is deeply dissected and eroded with canyons and associated development of alluvial fans emanating from many of the canyons (Figure 4). Within the UCL there are two significant gullies and canyon that intersect the range, Tantabiddi and Shothole Canyon, on the western and eastern sides of the range, respectively. These gullies can offer refugia for animals such as the black-footed rock-wallaby (*Petrogale lateralis* subsp. *lateralis*) and flora, such as *Tinospora esiangkara*.



**Figure 4.** A view of the canyon incised into Cape Range by the Tantabiddi Creek.

## **Cape Range Karst**

The Cape Range karst is one of several karst systems within Australia that occur in Tertiary limestone. Karst refers to a type of landscape formed from the dissolution of carbonate rocks, such as limestone, by water and results in the formation of caves, fissures, and sinkholes (Webb *et al.* 2003). The precise age of the karst systems in Cape Range is unknown, but it must have formed after the uplifting of the range. The deeply dissected landscape, the caves and the cave morphology indicate that the caves formed at a time when the area was much wetter than at present (Humphreys 2000).

A report commissioned by DEC details the karst features found on the Cape Range peninsula (Brooks 2009). Currently, 791 karst features have been recorded from Cape Range peninsula, with the majority recorded as caves. Five hundred and sixty caves are known on Cape Range, occurring mainly within the Tulki limestone (Brooks 2009; Figure 5) although caves are found within all the limestone formations. Approximately 45 karst features within UCL, with nearly half on the western coastal plain.

The coastal caves and sinkholes found on the western plain of the peninsula occur in Bundera calcarenite. These caves are connected to the ocean and as a consequence influenced by marine tides (Figure 6). Achialine environments are typically formed where the fresh groundwater of the Cape Range peninsula meets this coastal seawater. These environments consist of a freshwater lens overlying a deeper layer of seawater and show a strong vertical stratification with respect to temperature, salinity and other physico-chemical parameters. This aquatic environment can extend up to 2km inland on the peninsula (Humphreys And Adams 1991).

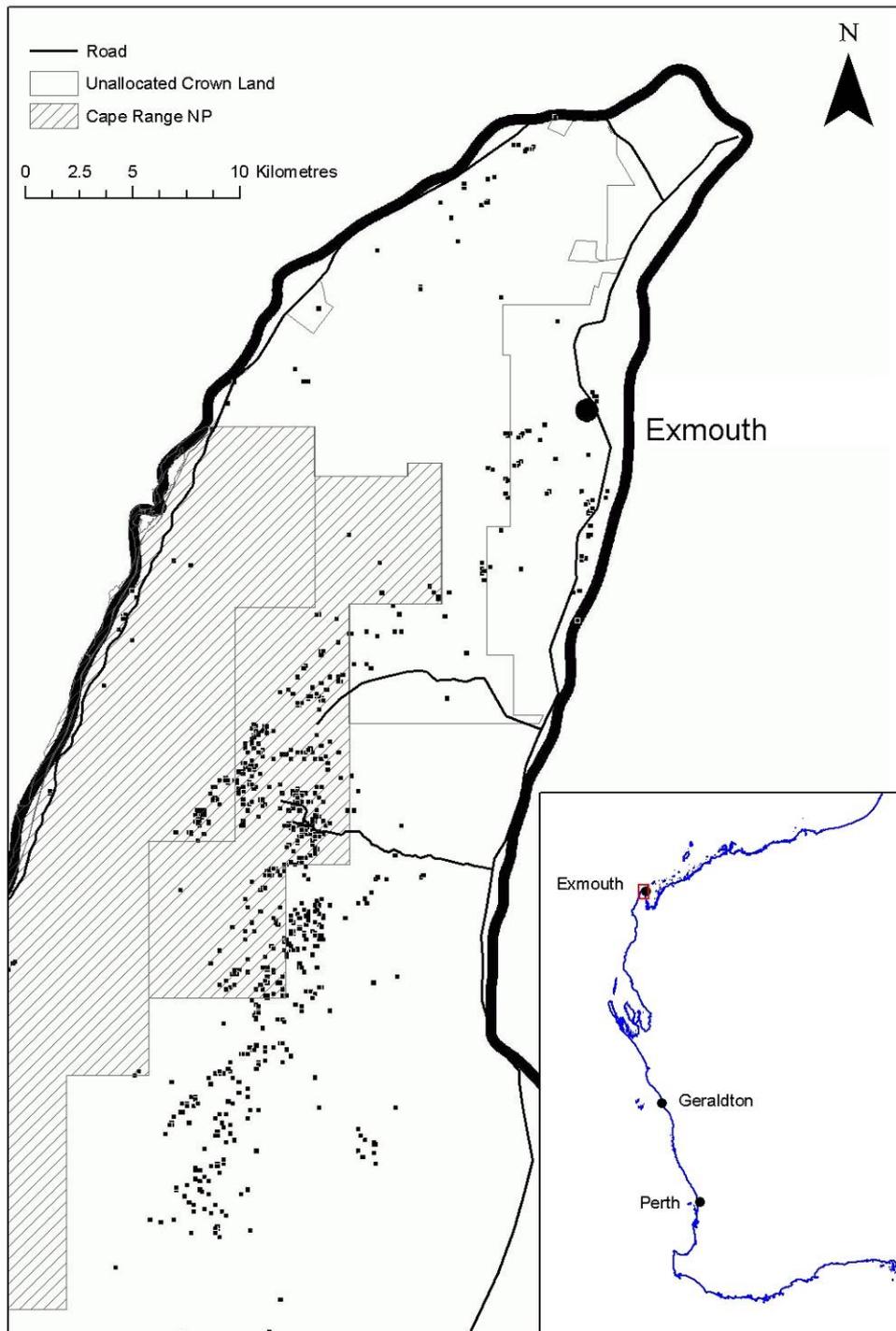


Figure 5. The location of karst features on Cape Range peninsula from Brooks (2009)



**Figure 6. An example of an anchialine sinkhole in the UCL, where the stygofauna have been recorded.**

The flooded karst system on the coastal plain is important as it supports the communities of stygofauna. Stygofauna are defined as subterranean animals that live below the surface throughout their entire life in aquifers and other water bodies. The coastal fauna are unrelated to that of the range, due to their different origins. The stygofauna found on the Cape Range peninsula are relictual taxa with evolutionary links to the Tethys sea, an ancient sea separating the supercontinents of Laurasia and Gondwanaland. The stygofauna and troglifauna of the UCL will be discussed in more detail later in the report.

The karst system on the range provides habitat for troglifauna, subterranean animals that live their entire life below ground in the caves, voids and other interstitial spaces on Cape Range. The evolutionary relationships of these species extend to periods when Australia was much wetter and more tropical than it is today.

Additional to the biological values, Russell (2004) rated the Cape Range karst system as possessing high to very high natural heritage values for geological and geomorphic

features such as solution and collapse sinkholes, karst etch plateau, episodic exsurgent springs, caves of various types, alluvial fan deposits and beach and dune deposits.

## VEGETATION

The Cape Range peninsula is located within the Cape Range subregion of the Carnarvon IBRA (Interim Biogeographic Regionalisation for Australia). The vegetation of the subregion is characterised by Bowgada (*Acacia ramulosa*) low woodland on sandy ridges and plains, snakewood (*Acacia xiphophylla*) scrub on clay flats, tree to shrub stepped over hummock grasslands on and between red sand dune fields, and in the north outcrops of *Acacia startii* or *Acacia bivenosa* shrublands on limestone strata (Kendrick & Mau 2003).

The flora of the area has been well collected and described but there has been no comprehensive and detailed survey of the Cape Range peninsula. Beard (1975) mapped the cape as part of a broader vegetation survey of the Pilbara (1:1 000 000 scale). According to Beard (1975), there are three broad vegetation types within the UCL; limestone hills and ranges, vegetation on the coastal plain and vegetation on the red sand dunes (Figure 7).

Following Beard's mapping, a rangeland condition survey of the Carnarvon Basin, classified two land systems, Range and Learmonth (Payne *et al.* 1987) and is consistent with Beard (1975). Land systems were used to assess rangeland resources and describe recurring patterns of geomorphology, vegetation and soils. The Range landsystem occurs primarily on limestone and quaternary sediments of the crests, summits, slopes and gorges of Cape Range while the Learmonth landsystem occurs on the gentle stony slopes, sandy plains and outwash alluvial plain receiving runoff from Cape Range.

The assessment of the vegetation within the UCL is limited due to the lack of any quantitative vegetation survey of the range. The only quantitative floristic sampling of the peninsula, to date, was conducted by Keighery and Gibson (1993), where 30 permanent quadrats (each 100 m<sup>2</sup>) were established across Cape Range and, as a comparison to other limestone ranges, Giralia and Rough Range. None of these

quadrats were placed within the UCL. They found that the communities on Cape Range were distinct from the nearby ranges.

This report will follow the broad vegetation classifications of Beard (1975), limestone hills, northern red dunes and coastal plains. In addition, traverses of the range were undertaken to provide more thorough descriptions and collections of flora.

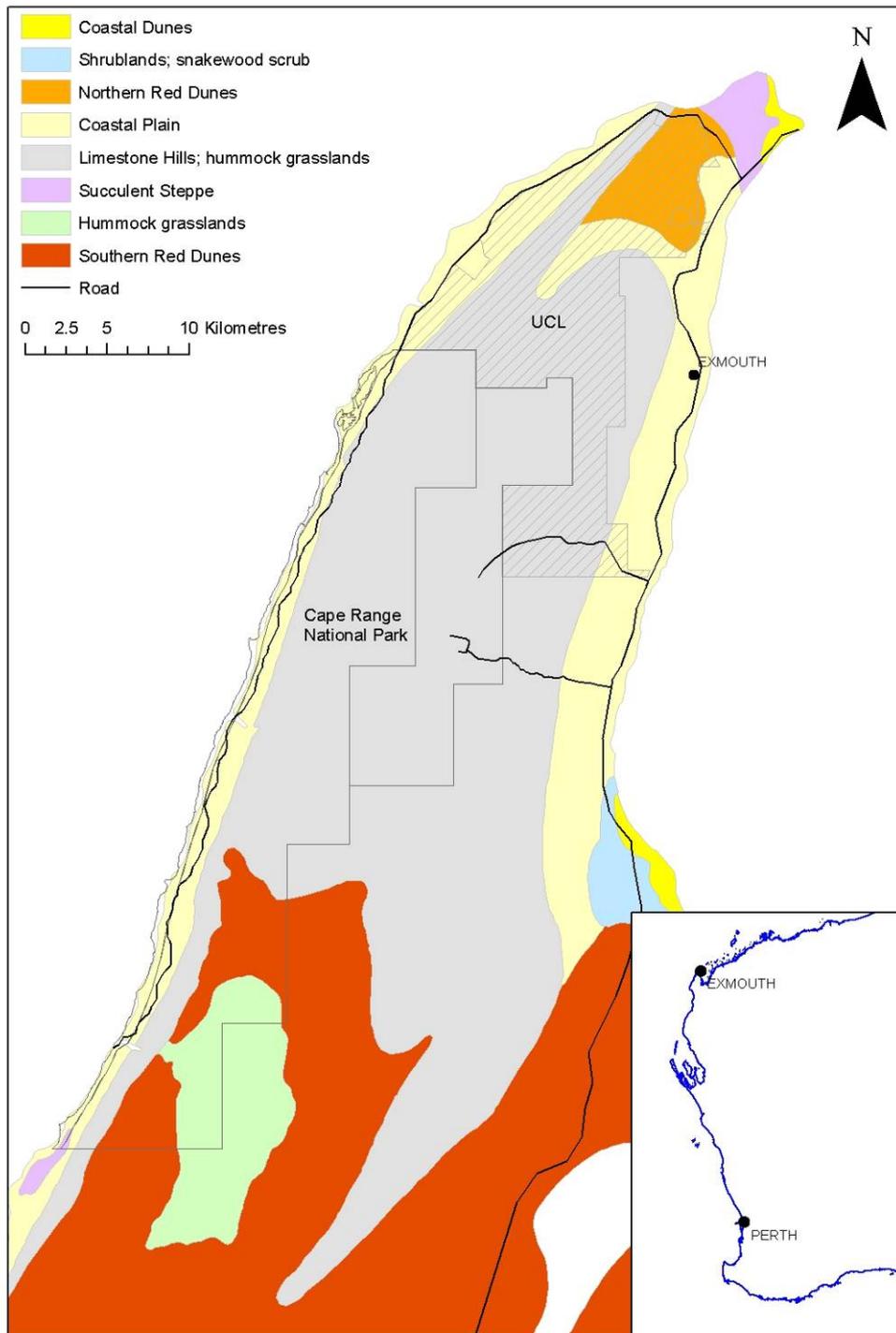


Figure 7. Beard (1975) vegetation types occurring on the Cape Range peninsula, showing the types within the UCL (hatched) and conserved within the Cape Range National Park.

## Limestone Hills

The vegetation occurring on the limestone ranges and hills is highly variable within the UCL. The description by Beard (1975) covers a wide area and encompasses a range of different geomorphologies from the dissected canyons, crests and slopes, as well as creeklines. Keighery and Gibson (1993) found that the communities occurring on the massive limestones were distinct from the nearby Giralia and Rough Range. The vegetation was characterised by shrublands of *Acacia tetragonophylla*, *Acacia bivenosa*, *Grevillea variifolia*, *Grevillea calcicola*, *Melaleuca cardiophylla*, *Ipomoea yardiensis* (on the terraces), *Triodia wiseana* or *Triodia pungens*.

Traverses of the ranges within the UCL revealed similar vegetation to what has been previously described by Beard (1975) and Keighery and Gibson (1993). The vegetation on the range generally occurs on skeletal soils on massive limestone. A traverse of the Shothole Canyon Road found in the gullies a mixed open shrublands of *Acacia bivenosa*, *Acacia pyrifolia* and *Eucalyptus prominens* or *Corymbia hamersleyana* over hummock grasslands of *Triodia angusta*, while the slopes and crest of the limestone range were characterised by isolated mallee trees of *Corymbia hamersleyana* over open hummock grasslands or shrublands of *Acacia bivenosa* and *Melaleuca cardiophylla* (Figure 8).



**Figure 8.** The vegetation on the slopes of Shothole Canyon Road within the unallocated Crown land. The vegetation on the slopes were shrublands of *Acacia bivenosa* and *Melaleuca cardiophylla* while gullies were characterised by mixed shrublands of *Acacia bivenosa* and *Corymbia hamersleyana* over hummock grasslands of *Triodia angusta*.

On the north western side of the range similar patterns were observed. Typically the crests can be characterised as shrublands of *Acacia arida* and *Acacia bivenosa* over hummock grasslands of *Triodia basedowii* and/or *Triodia wiseana* (Figure 9). Associated with this vegetation are a suite of species, which are generally present, such as *Ficus platypoda*, *Corymbia hamersleyana*, *Grevillea calcicola*, *Corchorus crozophorifolius*, *Hibbertia spicata*, *Melaleuca cardiophylla*, *Gossypium robinsonii*, *Acacia pyrifolia*, and *Eremophila forrestii* subsp. *capensis*.

Within the creeklines and gullies of Tantabiddi Creek, the vegetation was typically a shrubland of *Eucalyptus xerothermica*, *Corymbia hamersleyana* and *Dodonaea viscosa* subsp. *mucronata* over hummock grassland of *Triodia epactia*. The limestone walls support populations of *Ficus brachypoda* (Figure 10) and *Brachychiton obtusilobus*. This habitat also supported isolated plants of the priority taxon, *Abutilon* sp. Cape Range (A.S. George 1312).



**Figure 9. Low limestone hill (Jurabi Terrace) with *Acacia bivenosa* in the foreground.**



**Figure 10. A *Ficus brachypoda* seedling growing on a limestone wall alongside the Tantabiddi creek.**

## Red Sand Dunes

The vegetation on the red sand dunes has a distinct flora, with several unique taxa, to that on the limestone hills and ranges and the coastal plains. Keighery and Gibson (1993) placed a single quadrat in the red sand dunes on the southern part of the peninsula and found six out of the 16 species collected unique to the community.

There are two main dunes systems on the cape, the northern sand dunes that occur within the UCL, and the southern red sand dunes that are partially conserved within CRNP. The northern dunes were formed during the Pleistocene (18,000 bp) at a time when Australia was experiencing an increase in aridity. The northern sand dunes cover an area of approximately 3,000ha within the UCL with only ~50ha is currently represented within the conservation estate (Jurabi Coastal Park). Nearly 5000 ha of the southern red sand dunes are conserved in the CRNP (Table 1).

**Table 1. The current extent of vegetation as mapped by Beard (1975) on the Cape Range peninsula and the amount within the UCL and within conservation estate (CRNP, Jurabi Coastal Park and Bundegi Coastal Park).**

	Current Extent (ha)	UCL	Conservation Estate (ha)	% in Conservation Estate
Limestone	83,676.5	12968.0	35,055.1	41.8
Coastal	30,474.4	4725.0	6,095.4	22.5
Northern Red Sand	3,680.2	3069.0	47.0	1.3
Southern Red Sand	279,128.0	-	4993.9	1.8

Beard (1975) described the dunes as mixed *Acacia* scrub and dwarf shrub with soft spinifex and *Triodia basedowii*. The southern red sand dunes were described by Trudgen (1988, 1989) as a basic matrix of *Calytrix truncatifolia* and *Acacia spathulifolia* over *Thryptomene baeckeacea* and the hummock grasses *Triodia schinzii* and *Triodia epactia*, with much variation and addition of a variety of shrubs. There were no direct comparisons with the vegetation occurring on the northern sand dunes.

As part of this report, four 50 x 50m permanent quadrats were established, consistent with the vegetation quadrats of the Pilbara Biological Survey (Appendix 2). The crests of the dunes were characterised as mixed open shrublands of *Acacia spathulifolia*, *Daviesia pleurophylla*, *Banksia ashbyi* subsp. *boreoscaia*, *Corymbia zygophylla* and *Grevillea stenobotrya* over hummock grassland and shrublands of *Triodia schinzii*, *Triodia basedowii*, *Acacia gregorii* and *Calytrix truncatifolia* (Figure 11).

Swales were characterised as Open shrubland of *Banksia ashbyi* subsp. *boreoscaia*, *Corymbia zygophylla*, *Acacia bivenosa*, *Acacia spathulifolia* and *Corymbia zygophylla* over hummock grassland and shrublands of *Triodia basedowii*, *Triodia schinzii*, *Acacia gregorii* and *Hakea stenophylla* subsp. *stenophylla*.



**Figure 11.** A view of the vegetation on the Red Sand dunes within the UCL.

## **Coastal Plain**

Within the UCL, the coastal plains occur on both east and west sides of the range. Beard (1975) described the coastal plain as a hummock grasslands and shrub steppe of *Acacia bivenosa*, *Acacia coriacea* and *Acacia tetragonophylla* over *Triodia pungens* (sic) and *Triodia* sp. aff. *angusta*. Traverses for this report found similar vegetation

with open shrublands of *Acacia tetragonophylla*, *Acacia bivenosa* and *Olearia dampiera* subsp. *dampiera* over hummock grassland of *Triodia epactia* and/or open tussock grassland of Buffel grass (*Cenchrus ciliaris*). In addition, there are often large tracts of *Atriplex bunburyana* shrublands on the plains.



**Figure 12.** The coastal plain on the western side of Cape Range (in background). Buffel grass (*Cenchrus ciliaris*) is prominent in the foreground.

## FLORA

The Cape Range peninsula is the home to a rich arid zone flora with many endemic and disjunctly distributed taxa and a total of 19 Priority Flora species (Table 2). Many taxa reach their most northerly distribution on the peninsula, including species such as *Keraudrenia hermanniifolia* (Figure 13), which has a large disjunct distribution with the nearest known populations to those on the peninsula being at Shark Bay. This species is restricted to the red sand dunes and was initially recorded from the southern red dunes. New healthy populations of the taxa were found in the northern red dunes by the author for this report.



**Figure 13.** *Keraudrenia hermanniifolia* is a taxon that is at the northern end of its geographical distribution on the Cape Range peninsula and there is a large disjunct between the population on the peninsula and the nearest populations at Shark Bay.

A total of 270 taxa have been recorded within the UCL from herbarium records and opportunistic collections by the author in September 2009. In comparison, a total of 328 taxa have been collected from CRNP with 181 taxa in common. Eighty nine taxa were recorded solely from the UCL with 12 taxa found exclusively within the northern red sand dunes, however no priority taxa were found exclusively within the UCL (Table 2). The collections and records of the flora were restricted to easily accessed areas, adjacent to tracks and roads. Many of the flora are restricted to the gullies and creek lines of Cape Range peninsula (Table 2) and further survey of the UCL, especially the gorges and gullies, may find new populations of priority flora.

**Table 2. Priority taxa found on the Cape Range peninsula, including CRNP and the UCL, and their habitat. Definitions of Conservation Codes outlined in Appendix 7. All Priority taxa recorded within the UCL have also been recorded within CRNP.**

Species	Conservation Code	Endemic to Cape Range	Habitat	Recorded within UCL
<i>Abutilon</i> sp. Cape Range (A.S. George 1312)	P2	Y	Gullies and creek lines	Y
<i>Abutilon</i> sp. Hamelin (A.M. Ashby 2196)	P2		Limestone rises	N

<i>Acacia alexandri</i>	P3	Y	Stony creeks and limestone slopes	Y
<i>Acacia ryaniana</i>	P2		Coastal sand dunes	N
<i>Acacia startii</i>	P3		Stony creeks and watercourses	N
<i>Acanthocarpus rupestris</i>	P2		Limestone hills and creek lines	Y
<i>Brachychiton obtusilobus</i>	P4	Y	Coastal plains and hills	Y
<i>Corchorus congener</i>	P3		Coastal plains and hills	Y
<i>Crinum flaccidum</i>	P2		Swamps and creeks	
<i>Daviesia pleurophylla</i>	P2		Red sand dunes	Y
<i>Eremophila forrestii</i> subsp. <i>capensis</i>	P3	Y	Limestone hills and plains	Y
<i>Eremophila occidentis</i>	P2		Limestone hills	
<i>Grevillea calcicola</i>	P3	Y	Limestone hills	Y
<i>Harnieria kempeana</i> subsp. <i>rhadinophylla</i>	P2	Y	Base of gorges and limestone hills	Y
<i>Rhynchosia bungarensis</i>	P3		Floodplains and creeks	
<i>Stackhousia umbellata</i>	P3	Y	Limestone hills	Y
<i>Tinospora esiangkara</i>	P2	Y	Creek lines	Y
<i>Verticordia serotina</i>	P2	Y	Red sand dunes	

Within the UCL, eleven of the Cape's priority taxa have been recorded, either from herbarium records or opportunistic collections obtained during the compilation of this report (Figure 20). These Priority taxa were:

- *Abutilon* sp. Cape Range (A.S. George 1312) is a Priority 2 shrub, 0.8–1.5 m high with large yellow flowers and long silky hairs on the calyx. It is found within the limestone gullies of the range. It is poorly collected but 2 additional collections at new locations were made as part of this report.

- *Acacia alexandri* is a Priority 3 open or moderately dense shrub growing 1.5 to 3 m high with cream flowers. It is found growing on rocky slopes and gullies with the main collections around Shothole Canyon Road.
- *Acanthocarpus rupestris* is a Priority 2 rhizomatous, tufted perennial to 0.5 m high with small white flowers. This taxon is poorly collected and may easily be confused with *Acanthocarpus humilis* and *Acanthocarpus preissii*, which also occur on Cape Range peninsula.
- *Brachychiton obtusilobus* is a Priority 4 small tree growing to 6m. It is found growing mostly on the coastal plains but also on the limestone hills and range. This taxon is also an endemic to the Cape Range peninsula.



**Figure 14.** An example of a healthy tree of *Brachychiton obtusilobus*, located within Cape Range National Park.

- *Corchorus congener* is a Priority 2 spreading shrub to 75 cm found on Cape Range and Barrow Island. This species may be confused with other taxa such as *Sida* spp. and further targeted surveys will be required to determine the size of the populations at each site.



Figure 15. *Corchorus congener* is an endemic shrub to Cape Range. It was recorded from the two BRM site located within the UCL. (Photography by E. Wajon. Image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 30 November 2009.).

- *Daviesia pleurophylla* is a Priority 2 divaricately branched shrub, found only on the red sand dunes on the peninsula (Figure 13 & Figure 16). It grows to about 70 cm high with small racemes of 2-4 pea flowers.



Figure 16. *Daviesia pleurophylla*, an endemic pea shrub to the Cape Range peninsula and found on the red sand dunes within the UCL.

- *Eremophila forrestii* subsp. *capensis* is a Priority 3 shrub with distinct ovate leaves and spindly habit. It occurs scattered over the limestone hills of the range.



**Figure 17.** *Eremophila forrestii* subsp. *capensis* is an endemic shrub to Cape Range. This taxon was found at several potential BRM sites. (Photography by J. English. Image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 30 November 2009.).

- *Grevillea calcicola* is a Priority 3 tree with cream flowers in cylindrical inflorescences. It is commonly found on massive limestone and is endemic to the peninsula.



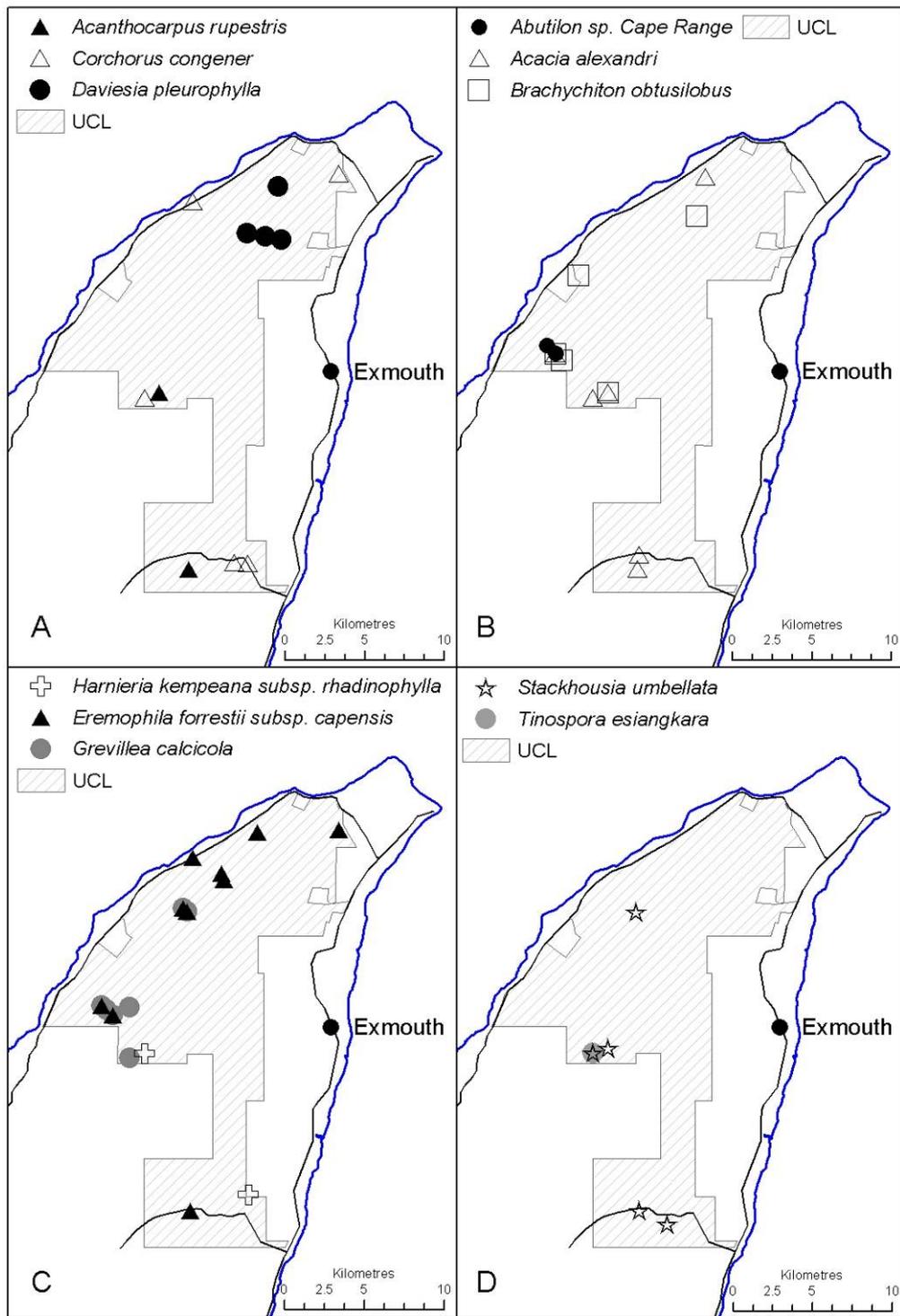
**Figure 18.** *Grevillea calcicola*, an endemic shrub to Cape Range, is commonly found on massive limestone.

- *Harnieria kempeana* subsp. *radinophylla* is a Priority 2 erect or sprawling, spreading, straggly shrub growing to 1 m high. It flowers from May to September with pink to red flowers. This species is restricted to Cape Range on calcareous loam amongst limestone and creek banks.
- *Stackhousia umbellata* is a Priority 3 perennial, prostrate shrub to 70 cm high. The leaves are small and reduced to scattered scales on the stems. The flowers occur in terminal umbels of up to 14 yellow flowers. It occurs on the coastal plains and limestone hills growing in skeletal soil over limestone.
- *Tinospora esiangkara* is a Priority 2 slender woody climber with small green flowers. It is found growing on rocky limestone outcrops and ridges and often

near creeklines. This taxon is restricted to the Cape Range peninsula, but is also found in Arnhem Land in the Northern Territory and Cape York Peninsula in Queensland.



**Figure 19.** *Tinospora esiangkara* is a Priority Two climber restricted to the north west cape in Western Australia. (Photography by M. Maier. Image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 4 January 2010).



**Figure 20.** The locations of Priority flora within the UCL, based upon Western Australian Herbarium and opportunistic collections by the author.

## **WEEDS**

Seven weeds have been recorded within the UCL, with buffel grass (*Cenchrus ciliaris*) the most pervasive and highly visible. This grass is abundant on the coastal plains of the western coast. Buffel grass is a perennial tussock grass native to Africa, the Middle East and southern Asia and is used in the pastoral industry as a pasture supplement throughout the Pilbara and Kimberley (Dixon *et al.* 2001). It is resistant to drought, fire and heavy grazing, making eradication extremely difficult, therefore preventing further spread is recommended.

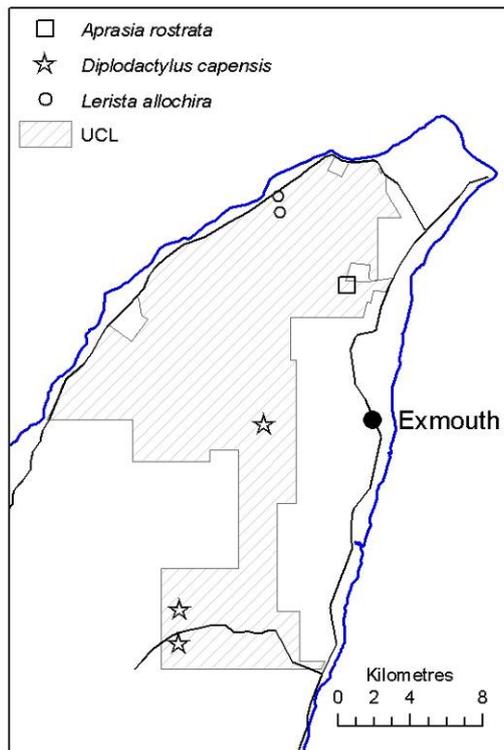
## **FAUNA**

The Cape Range peninsula has a diverse range of terrestrial and aquatic fauna. Of great significance are the subterranean communities of stygo- and troglofauna found within the extensive limestone karst system that underpins the peninsula. In addition, there are numerous taxa, including terrestrial vertebrates that are endemic to the range. Just like the flora and vegetation, the distributions of several animals occur at the northern or southern extents of their distribution.

As a large proportion of the UCL is covered by the red sand dunefields, a terrestrial fauna survey, with emphasis on terrestrial vertebrate fauna, was commissioned by Department of Environment and Conservation (formerly CALM) of the UCL (Metcalf & Bamford 2005). A third of the reptile and over half of the mammal species recorded in this survey were associated with the red sand dune habitat. Although there are red sand dune habitats represented within the National Park, the faunal communities of the northern and southern dunes are not identical (Metcalf & Bamford 2005). More information on reptiles, amphibians, mammals, birds and subterranean fauna is provided in the following sections.

### **Reptiles and Amphibians**

A total of 70 reptiles and four frogs have been recorded from the UCL, with three conservation taxa present (Appendix 4 & 5; Figure 21). The most abundant reptiles that have been recorded within the UCL are *Ctenophorus femoralis*, *Lerista bipes* and *Nephrurus levis* subsp. *occidentalis* (Metcalf & Bamford 2005).



**Figure 21. Locations of the threatened reptile fauna within the UCL.**

Recent taxonomic work has found several new reptiles that are endemic to the Cape Range including a new species of skink (*Egernia sp.*), found exclusively on the red sand dunes, and a new species of Web-toed Gecko (*Gehyra sp.*) (P. Doughty, pers. comm.<sup>1</sup>). Most recently described *Diplodactylus capensis*, is a Priority 2 gecko, endemic to the peninsula (Figure 22). This species is found on the hard rocky limestone substrates of the range. *Aprasia rostrata*, the threatened Hermite Island worm-lizard, was previously thought to occur only on the Montebello Islands, but has recently been recorded on the peninsula. Prior to the recent taxonomic work only two endemic reptiles were recorded from the peninsula: the Priority 2 blindsnake, *Ramphotyphlops splendidus* (which has not been recorded within the UCL) and the pygopod, *Delma tealei* (Doughty *et al.* 2008).

<sup>1</sup> Paul Doughty, Curator of Terrestrial Zoology, , Western Australian Museum.



**Figure 22.** The Cape Range Gecko, *Diplodactylus capensis*, which is restricted to the massive limestone of Cape Range. Photo by B Maryan Western Australian Museum

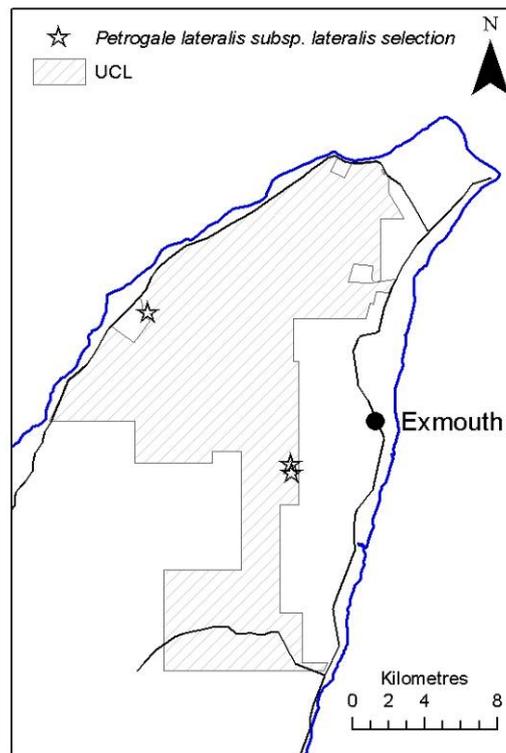
## **Mammals**

Unlike the reptile fauna, the Cape Range peninsula has low levels of endemism in the mammal fauna. A total of 15 mammals have been recorded from the UCL with four introduced species (Appendix 6). High populations of euros (*Macropus robustus*) have been observed within the UCL (DEC 2009) and are attracted to the area by the presence of buffel grass (*Cenchrus ciliaris*). The increase in densities could lead to a greater grazing pressure on the landscape.



**Figure 23.** A black-footed rock-wallaby (*Petrogale lateralis* subsp. *lateralis*), a threatened species found on the Cape Range peninsula.

The only recorded threatened fauna species on the UCL is *Petrogale lateralis* subsp. *lateralis* (black-footed rock-wallaby; Figure 23). The presence of this rock wallaby has been verified by scats only (Figure 24). This species once had a widespread albeit fragmented distribution in central and southern Western Australia but populations have been severely reduced through predation by foxes (Pearson & Kinnear 1997). Existing populations are scattered across Western Australia and the western most populations occur in CRNP. The remaining mammals all have widespread arid-zone distributions.



**Figure 24.** Location of black-footed rock wallaby scats within the UCL; no animals have been sighted.

Five bats have been recorded from the peninsula (Kendrick 1993) but only 2 have been recorded within the UCL. This may be due to the lower number of suitable cave habitats present in the UCL when compared to the rest of the range. The presence of bats is usually detected through echolocation calls, but during the Metcalf & Bamford (2005) survey, none were recorded. Both bats known from the UCL were recorded

from Padjari Manu cave, one of the few caves on the western side of the range in the UCL.

## **Birds**

Nearly 200 birds have been recorded from the Cape Range peninsula (Birds Australia 2010) compared to 150 birds recorded within the CRNP checklist (CALM 1987). Thirty five birds have been recorded within the UCL which is a small proportion of the potential avifauna. As birds are highly mobile, it is likely that more species are present but have yet to be recorded. Kendrick (1993) observed three broad biogeographic patterns within the avifauna of the Cape Range peninsula; species ubiquitous to the area, endemic or locally restricted species and those species whose natural distributions reach their furthest extent. This includes both southern species reaching their northern extent and northern species reaching their southern extent. There are no known endemic species to the peninsula but there are several locally restricted species, including the spinifex pigeon (*Geophaps plumifera*) and the Grey Shrike-thrush (*Colluricincla harmonica*) (Storr 1984). Populations on the peninsula show some differences in morphology from the inland Pilbara populations but in most instances no molecular distinctions have been made between Cape Range and the greater Pilbara populations. Potentially, a subspecies of western bowerbird (*Ptilonorhynchus guttatus carteri*) may show such molecular differences. Currently, the only notable difference between the populations is a difference in size, with the Cape Range population smaller than those occurring in the Pilbara (Frith & Frith 1997).

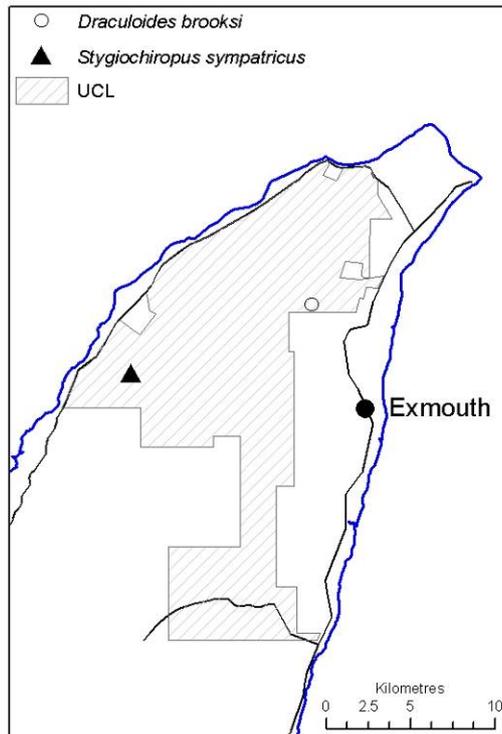
Migratory birds, commonly seabirds, visit the coast of Cape Range peninsula annually. Many of these birds are protected by an international agreement between the governments of Japan, China and the Republic of Korea. Two migratory birds have been recorded within the UCL compared to 22 birds within Cape Range National Park (Appendix 7). The main habitats for these birds are the shoreline and mangroves, which are habitats not found within the UCL. It is possible that canyon walls within the UCL may provide possible nesting sites for these birds and appropriate surveys may reveal new sites.

## Subterranean Fauna

The stygofauna and troglofauna of Cape Range peninsula are unique and mostly endemic to the region. Stygofauna refers to subterranean aquatic fauna while troglofauna refers to animals that live within caves and other small cavities within the limestone of the peninsula. The collections and records of these subterranean fauna are restricted to areas of direct open access such as sinkholes, caves and man-made boreholes; however the fauna are likely to occur throughout the coastal groundwater and limestone on the Cape.

The cave habitats have remained relatively stable environment over long periods of time and make ideal refugia. The troglobites spend their entire life within caves and other subterranean habitats and are highly adapted to this life style with reduction and often complete loss of eyes and body pigment, in addition to the lengthening of appendages, and enhancement of non-optic sensory structures, such as antennae and sensory hairs (Eberhard & Humphreys 2003).

The troglobites recorded from Cape Range evolved from surface dwelling ancestors, commonly in families that are represented in moist soil and ground litter of forest floors or in streambeds, swamps, groundwater and marine crevice habitats. With the increasing aridity as Australia moved northwards, these forest floor animals retreated underground. There have been over 30 species of troglofauna identified on the Cape Range peninsula, with a diverse array of arachnids and myriapods (Humphreys 2000). Within the UCL three troglobites that have been recorded, *Draculoides brooksi*, *Stygiochiropus communis* and *S. sympatricus* (Figure 25), all are endemic to the peninsula, with *Draculoides brooksi* known only from the UCL. *Draculoides brooksi* is a schizomid arachnid, and was collected from a litter baited trap in a borehole that had been drilled to limestone in the Pleistocene dunefield (Harvey 2001). To date, it has only known from the UCL. *Stygiochiropus communis* and *Stygiochiropus sympatricus* have both collected from the UCL and are troglobitic millipedes (Humphreys & Shear 1993).



**Figure 25.** Location of the two invertebrate troglofauna within the UCL on Cape Range peninsula.

Two species of blind fishes *Milyeringa veritas* and *Ophisternon candidum* and two atyid shrimps, *Stygiocaris lancifera* and *S. stylifera*, were initially the only aquatic fauna recorded from the Cape Range until the 1990's when more taxa such as isopods, amphipods, ostacods, were described (Humphreys 2000). There is some overlap with stygofauna present on Barrow Island, 170 km northeast of the cape. Barrow Island has a similar geology to the cape as is part of the same bioregion – Carnarvon Basin.

Within the stygofauna are two vertebrates, *Milyeringa veritas* (Blind Gudgeon) and *Ophisternon candidum* (Blind Cave Eel). Several new collections have been made of stygobiotic eels from Barrow Island and the Pilbara, and preliminary taxonomic work indicates that they may be distinct from *Ophisternon candidum* although additional morphological and molecular studies are required to confirm this proposition (Kendrick pers comm.).

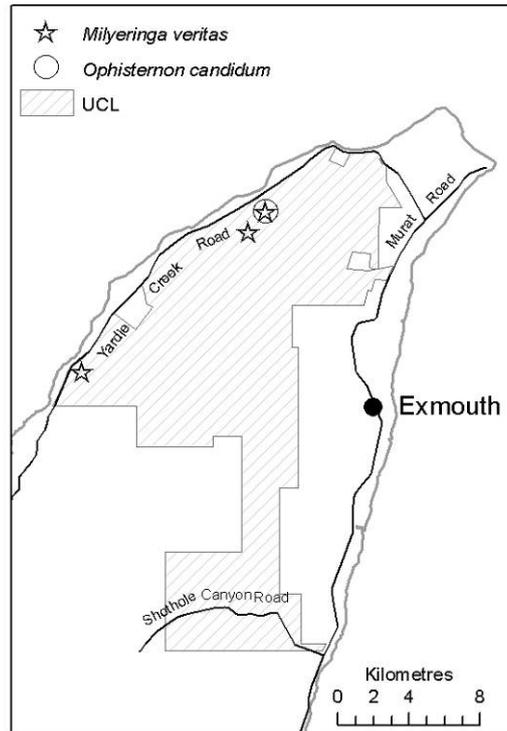
*Milyeringa veritas* is endemic to the Cape Range peninsula and Barrow Island and is found in freshwater and anchialine ecosystems on the coastal plain of Cape Range and Barrow Island (Humphreys 2001; Figure 26). They have been recorded exclusively

from the karst system from within 150 metres of the coast to 4.3 kilometres inland. In the UCL, they have been recorded from three locations (Figure 27). They exhibit adaptations to cave environments with lack of pigmentation, well-developed sensory papillae on the head and absence of eyes (Knott 1993). They range in size from 5 to 57 millimetres and feed upon the crustacean stygofauna and terrestrial insects, including troglofauna, that accidentally fall into water bodies (Humphreys & Feinberg 1995).



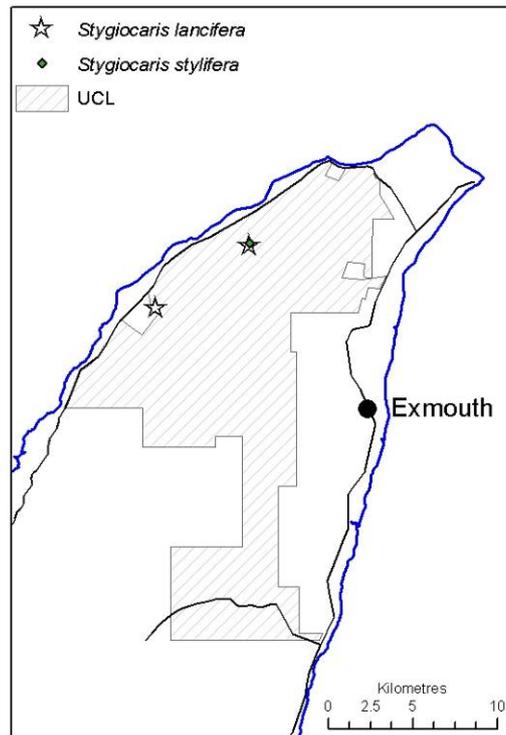
**Figure 26.** *Milyeringa veritas*, the endemic Blind Gudgeon, that is endemic to Cape Range peninsula and Barrow Island. Photo D Elford WA Museum.

*Ophisternon candidum* appears to be endemic to the Cape Range peninsula and found in similar habitat to *Milyeringa veritas*, albeit much rarer and seen infrequently. It is eyeless, with only the caudal fin present, as a reduced rayless membrane, all troglomorphic adaptations. Only one record of this species has been recorded within the UCL (Figure 27).



**Figure 27. Location of the two vertebrate stygofauna of the Cape Range peninsula.**

The distributions of related forms of present day invertebrate stygofauna indicate a Tethyan Ancestry of the known stygofauna from Cape Range (Knott 1993). The Tethys sea dates to the Cretaceous, and was an ancient sea separating the supercontinents of Laurasia and Gondwanaland. The two significant invertebrate stygofauna identified within the UCL are subterranean shrimp of the genus *Stygiocaris* - *Stygiocaris lancifera* and *Stygiocaris stylifera*. These shrimp are very similar morphologically and can be difficult to differentiate (Knott 1993). Both shrimps are colourless and have reduced eyes. Both are relatively abundant in the groundwater, occurring in fresh and anchialine waters of the coastal plain. Both have been recorded from the western coastal plain (Figure 28).



**Figure 28. Location of the two invertebrate stygofauna within the UCL on Cape Range peninsula.**

Speciation has occurred across and along the cape within the *Stygiocaris* species. *Stygiocaris lancifera* show a small divergence between northern and southern populations on the Cape while *Stygiocaris stylifera* shows differences between populations on the east and west side of the range (Page *et al.* 2008). Similar pattern also exists for *Milyeringa veritas*, with a geographical split between western and eastern populations. As a consequence, the conservation of the UCL would ensure this genetic diversity remains conserved and intact.

## Introduced Animals

Two rodents have been recorded within the UCL, the house mouse and black rat (Appendix 3 – Mammals). Although not recorded in Museum WA records, it is highly likely that there are foxes and feral cats present within the UCL, especially the latter which are often associated with areas of human habitation. Predation by foxes and cats on native animals is listed as a threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The presence of goats was not directly observed by the author, but it is also likely that this animal is present within the UCL as they are also widespread across the peninsula and were observed within the national park. Goats are in direct competition with native animals for food resources, water and also shelter. They are also listed as a threatening process under the EPBC Act.

## RECOMMENDATIONS

The UCL covers approximately 20, 000 ha of the northern end of the Cape Range peninsula and remains relatively unutilised apart for minor recreational and tourism activities. Known conservation values within the area include habitats and species not represented, or underrepresented in the conservation reserve system (Table 3).

The key conservation values of the UCL are:

- nine registered indigenous sites;
- occurrence of the wave-cut platforms on the western side of the range, representing geological history of the peninsula;
- extensive karst system with approximately 50 features including anchialine habitats;
- northern red sand dunes, which are under-represented within the conservation reserve (< 1.5%). The dunefield provides habitat for unique fauna and flora communities, in addition to endemic taxa;
- presence of species (flora and fauna) at their northern or southern extent of their range;
- 11 priority flora;
- 89 flora recorded in UCL not represented in CRNP; 12 taxa found exclusively in northern red sand dunes;
- 70 reptiles, 4 frogs. 15 mammals and 35 birds recorded;
- 3 reptiles of conservation significance endemic to the peninsula;
- 3 protected birds;
- presence of protected stygofauna and troglofauna, with one found only in the UCL; and
- genetic diversity of the stygofauna shrimp (*Stygiocharis* spp.) north and south or east and west.

**Table 3. Summary of the biodiversity assets/attributes found within the UCL on the Cape Range peninsula and their conservation significance. The conservation status of fauna is listed under the Wildlife Conservation Act 1950. Schedule 1 refers to fauna that is rare or is likely to become extinct, and is declared to be fauna that is in need of special protection. Schedule 3 refers to Migratory birds protected under an international agreement.**

Biodiversity Asset	Conservation Status	Endemic to UCL	Endemic to Cape Range Peninsula
<u>Vegetation</u>			
Northern Red Sand Dunes		+	+
<u>Flora</u>			
<i>Abutilon</i> sp. Cape Range (A.S. George 1312)	P2		+
<i>Acacia alexandri</i>	P3		+
<i>Acanthocarpus rupestris</i>	P3		
<i>Brachychiton obtusilobus</i>	P4		+
<i>Corchorus congener</i>	P3		
<i>Daviesia pleurophylla</i>	P2		+
<i>Eremophila forrestii</i> subsp. <i>capensis</i>	P3		+
<i>Grevillea calcicola</i>	P3		+
<i>Harnieria kempeana</i> subsp. <i>rhadinophylla</i>	P2		+
<i>Stackhousia umbellata</i>	P3		+
<i>Tinospora esiangkara</i>	P2		+
<u>Reptiles</u>			
<i>Aprasia rostrata</i>			
<i>Diplodactylus capensis</i>			+
<i>Lerista allochira</i>			+
<u>Stygofauna</u>			
<i>Milyeringa veritas</i>	Schedule 1		
<i>Ophisternon candidum</i>	Schedule 1		
<i>Stygiocaris lancifera</i>	Schedule 1		+
<u>Troglafauna</u>			

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<i>Draculoides brooksi</i>	Schedule 1	+	
<i>Stygiochiropus sympatricus</i>	Schedule 1		+
<b><u>Birds</u></b>			
<i>Charadrius mongolus</i>	Schedule 3		
<i>Falco peregrinus</i>	Specially Protected		
<i>Numenius madagascariensis</i>	Schedule 3		

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The northern red sand dunes are found almost entirely within the UCL and are of high conservation value and as a consequence should be a high priority for conservation. In order to quantify the conservation status of this vegetation and habitat, additional flora and fauna surveys of both the northern and southern dunefields are recommended. Further research into the new species of reptile from the dunefields would add valuable information to the biodiversity values of the peninsula.

As well as the conservation of the red dunes, the addition of the UCL to the conservation estate would increase the conservation of the anchihaline habitats present on the coastal plain. These habitats are important for the conservation of the vertebrate stygofauna, and also the maintenance of genetic diversity of the stygofauna.

The UCL also contains the northern extent of the Cape Range which has high conservation and landscape values. Management of the whole range formation in the conservation reserve system would help to protect these values. The inclusion of areas of UCL in the conservation reserves systems has been supported by successive State Government reports and plans. This report further demonstrates the conservation values contained in the UCL. The area of UCL, or parts of it, would be a valuable addition to the conservation estate by increasing the amount of land conserved with the Carnarvon IBRA region and contributing to a comprehensive, adequate and representative reserve system.

## **Sources of information**

In addition to the collections of flora from the study area by the author, information was gathered from various sources; records from the Western Australian Museum

and Western Australian Herbarium were obtained using Naturemap (<http://www.naturemap.dec.wa.gov.au>); information gathered from various reports; obtained by individual researchers (pers. comm.); Birds Australia database; research papers on Cape Range taxa; Aboriginal Heritage Inquiry System.

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## APPENDIX 1 – INDIGENOUS SITES

Site ID	Site Name	Status	Access	Site Type	Additional Information	Restriction	Last Updated	Coordinates (GDA94)	Coordinate Accuracy
756	WINPIKANYA	Permanent Register	Closed	Ceremonial, Mythological, Engraving, Grinding patches / grooves	Camp, Water Source	Female Access	4/01/2001	Not Available for Closed Sites	Unreliable
11885	PADJARI MANU CAVE (Formerly Bunbury Cave)	Permanent Register	Closed	Ceremonial, Painting, Engraving, Artefacts / Scatter	Archeological Deposit, Water Source	No restriction	28/03/2000	Not Available for Closed Sites	Reliable
6017	YARDIE CREEK CARAVAN BURIAL	Permanent Register	Open	Skeletal material/Burial		No restriction	15/09/2000	191538mE 7576555mN Zone 50	Unreliable
6119	PAP HILL 1.	Insufficient Information	Open		Rockshelter	No restriction	15/09/2000	198238mE 7581955mN Zone 50	Reliable
6120	PAP HILL 2.	Insufficient Information	Open	Grinding patches / grooves	Rockshelter	No restriction	15/09/2000	198138mE 7581855mN Zone 50	Reliable
11400	YARDIE CREEK STATION	Permanent Register	Open	Engraving		No restriction	3/12/1998	191638mE 7576655mN Zone 50	Unreliable

Biodiversity values of Unallocated Crown Land on the Cape Range peninsula

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11401	5 Mile Well (Cape Range)	Permanent Register	Open	Painting, Engraving, Quarry, Artefacts / Scatter	Archeological Deposit	No restriction	3/12/1998	198638mE 7583655mN Zone 50	Unreliable
17447	PAP HILL OCHRE	Permanent Register	Open	Ceremonial, Grinding patches / grooves	Ochre, Rockshelter	No restriction	18/07/2000	198327mE 7581741mN Zone 50	Reliable
17448	CHUGORI ROCKHOLE	Permanent Register	Open	Ceremonial, Mythological, Man-Made Structure, Grinding patches / grooves	Water Source	No restriction	18/07/2000	193482mE 7579323mN Zone 50	Reliable

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## **APPENDIX 2 – NORTHERN RED DUNE SURVEY**

### **Methods**

The methodology employed in this survey followed the standard procedure used in the vegetation survey of the Pilbara IBRA region of Western Australia (McKenzie *et al.* 2009). Four 50 x 50m quadrats were established on the dune crests and the swales of the red dunefield in the northern part of the unallocated Crown land. Each quadrat was permanently marked with four steel fence droppers and its positions were determined using a Global Positioning System (GPS) unit. All vascular plants within the quadrat were recorded and collected for later identification at the Western Australian Herbarium. Growth form, height and cover were recorded for dominant taxa in each stratum (tallest, mid- and lower). The quantitative data were used to describe the plant communities for each quadrat following McDonald *et al.* (1990).

## Dune01



### Coordinates

21° 51' 41.5" S

114° 04' 32.6" E

### Altitude

74.2m

### Site Description

Level swale of red brown deep sandy soils.

### Vegetation Description

Open shrubland of *Banksia ashbyi* subsp. *boreoscaia*, *Acacia spathulata* and *Corymbia zygophylla* over hummock grassland and shrublands of *Triodia basedowii*, *Acacia gregorii* and *Hakea stenophylla* subsp. *stenophylla*.

**Species**

**Amaranthaceae**

*Ptilotus astrolasius* var.

*astrolasius*

**Asparagaceae**

*Thysanotus patersonii*

**Boraginaceae**

*Heliotropium glanduliferum*

*Trichodesma zeylanicum*

**Caesalpiniaceae**

*Labichea cassioides*

**Dasygongonaceae**

*Acanthocarpus humilis*

**Dilleniaceae**

*Hibbertia spicata* subsp.

*spicata*

**Goodeniaceae**

*Dampiera incana* var. *incana*

*Scaevola cunninghamii*

**Hemerocallidaceae**

*Tricoryne corynothecoides*

**Lamiaceae**

*Pityrodia loxocarpa*

**Malvaceae**

*Gossypium robinsonii*

*Hibiscus leptocladus*

**Mimosaceae**

*Acacia bivenosa*

*Acacia gregorii*

*Acacia sericophylla*

*Acacia spathulata*

**Molluginaceae**

*Mollugo molluginea*

**Myrtaceae**

*Corymbia zygophylla*

*Melaleuca cardiophylla*

**Papilionaceae**

*Indigofera bovipерda* subsp.

*bovipерda*

*Leptosema macrocarpum*

**Poaceae**

*Eragrostis eriopoda*

*Triodia basedowii*

*Triodia schinzii*

**Proteaceae**

*Banksia ashbyi* subsp.

*boreoscaia*

*Grevillea eriostachya*

*Hakea stenophylla* subsp.

*stenophylla*

**Santalaceae**

*Exocarpos sparteus*

**Solanaceae**

*Solanum lasiophyllum*

**Sterculiaceae**

*Hannafordia quadrivalvis*

subsp. *recurva*

**Thymelaeaceae**

*Pimelea ammocharis*

## Dune02



### **Location**

21° 51' 34" S

114° 04' 34" E

### **Altitude**

69 m

### **Site Description**

Level dune crest of deep red brown sandy soil.

### **Vegetation Description**

Shrubland of *Acacia spathulata*, *Daviesia pleurophylla* and *Grevillea stenobotrya* over hummock grassland and shrublands of *Triodia schinzii*, *T. basedowii* and *Calytrix truncatifolia*

**Species**

*Amaranthaceae*

*Ptilotus gomphrenoides*

*Asteraceae*

*Olearia dampieri* subsp.

*dampieri*

*Boraginaceae*

*Trichodesma zeylanicum*

*Caesalpinaceae*

*Labichea cassioides*

*Dasyogonaceae*

*Acanthocarpus humilis*

*Goodeniaceae*

*Dampiera incana* var. *incana*

*Scaevola sericophylla*

*Lamiaceae*

*Pityrodia loxocarpa*

*Malvaceae*

*Corchorus elachocarpus*

*Mimosaceae*

*Acacia gregorii*

*Acacia spathulata*

*Myrtaceae*

*Calytrix truncatifolia*

*Corymbia zygophylla*

*Pileanthus septentrionalis*

*Verticordia forrestii*

*Olacaceae*

*Olax aurantia*

*Papilionaceae*

*Daviesia pleurophylla* Priority

2

*Indigofera bovipерda* subsp.

*bovipерda*

*Poaceae*

*Eragrostis eriopoda*

*Triodia basedowii*

*Triodia schinzii*

*Proteaceae*

*Banksia ashbyi* subsp.

*boreoscaia*

*Grevillea stenobotrya*

*Santalaceae*

*Exocarpos sparteus*

*Sterculiaceae*

*Keraudrenia hermanniifolia*

## Dune03



### **Location**

21° 51' 34.7" S

114° 05' 2.8" E

### **Altitude**

57.5 m

### **Site Description**

Level swale of deep red brown sandy soil.

### **Vegetation Description**

Isolated shrubs of *Corymbia zygophylla* and *Acacia bivenosa* over closed hummock grasslands and shrubland of *Triodia schinzii*, *T. basedowii* and *Acacia gregorii*

## Species List

### Boraginaceae

*Heliotropium glanduliferum*

### Caesalpiniaceae

*Petalostylis labicheoides*

### Goodeniaceae

*Scaevola cunninghamii*

### Hemerocallidaceae

*Tricoryne corynothecoides*

### Lamiaceae

*Pityrodia loxocarpa*

### Mimosaceae

*Acacia bivenosa*

*Acacia gregorii*

*Acacia spathulata*

*Acacia tetragonophylla*

### Myrtaceae

*Corymbia zygophylla*

*Verticordia forrestii*

### Papilionaceae

*Chorizema racemosum*

*Indigofera bovipерda* subsp.

*bovipерda*

### Poaceae

*Eriachne mucronata*

*Triodia basedowii*

*Triodia schinzii*

### Proteaceae

*Grevillea stenobotrya*

## Dune04



### Location

21° 51' 40" S

114° 05' 33" E

### Altitude

57m

### Site Description

Dune crest of deep red brown sandy soil.

### Vegetation Description

Open shrublands of *Grevillea stenobotrya*, *Acacia spathulata*, *Banksia ashbyi* subsp. *boreoscaia* and *Corymbia zygomphylla* over hummock grasslands of *Triodia basedowii*, *T. schinzii*, *Calytrix truncatifolia* and *Acacia gregorii*

### Species

#### Amaranthaceae

*Ptilotus gomphrenoides*

*Olearia dampieri* subsp.

*dampieri*

#### Asteraceae

#### Caesalpiaceae

*Labichea cassioides*

**Dasyopogonaceae**

*Acanthocarpus humilis*

*Grevillea eriostachya*

*Grevillea stenobotrya*

**Goodeniaceae**

*Dampiera incana* var. *incana*

*Scaevola cunninghamii*

*Scaevola sericophylla*

*Hakea stenophylla* subsp.  
*stenophylla*

**Sterculiaceae**

*Keraudrenia hermanniifolia*

**Gyrostemonaceae**

*Gyrostemon ramulosus*

**Lamiaceae**

*Pityrodia loxocarpa*

**Mimosaceae**

*Acacia sericophylla*

*Acacia spathulata*

*Acacia stellaticeps*

**Myrtaceae**

*Calytrix truncatifolia*

*Corymbia zygophylla*

*Pileanthus septentrionalis*

*Verticordia forrestii*

**Olacaceae**

*Olax aurantia*

**Papilionaceae**

*Daviesia pleurophylla* Priority

2

*Indigofera boviperda* subsp.

*boviperda*

*Leptosema macrocarpum*

**Poaceae**

*Eragrostis eriopoda*

*Triodia basedowii*

*Triodia schinzii*

**Proteaceae**

*Banksia ashbyi* subsp.

*boreoscaia*

## Comparison of all 4 sites

Species	DUNE01	DUNE02	DUNE03	DUNE04
<b>Amaranthaceae</b>				
<i>Ptilotus astrolasius</i> var. <i>astrolasius</i>	*			
<i>Ptilotus gomphrenoides</i>		*		*
<b>Asparagaceae</b>				
<i>Thysanotus patersonii</i>	*			
<b>Asteraceae</b>				
<i>Olearia dampieri</i> subsp. <i>dampieri</i>		*		*
<b>Boraginaceae</b>				
<i>Heliotropium glanduliferum</i>	*		*	
<i>Trichodesma zeylanicum</i>	*	*		
<b>Caesalpiaceae</b>				
<i>Labichea cassioides</i>	*	*		*
<i>Petalostylis labicheoides</i>			*	
<b>Dasypogonaceae</b>				
<i>Acanthocarpus humilis</i>	*	*		*
<b>Dilleniaceae</b>				
<i>Hibbertia spicata</i> subsp. <i>spicata</i>	*			
<b>Goodeniaceae</b>				
<i>Dampiera incana</i> var. <i>incana</i>	*	*		*
<i>Scaevola cunninghamii</i>	*		*	*
<i>Scaevola sericophylla</i>		*		*
<b>Gyrostemonaceae</b>				
<i>Gyrostemon ramulosus</i>				*
<b>Hemerocallidaceae</b>				
<i>Tricoryne corynothecoides</i>	*		*	

Species	DUNE01	DUNE02	DUNE03	DUNE04
<b>Lamiaceae</b>				
<i>Pityrodia loxocarpa</i>	*	*	*	*
<b>Malvaceae</b>				
<i>Corchorus elachocarpus</i>		*		
<i>Gossypium robinsonii</i>	*			
<i>Hibiscus leptocladus</i>	*			
<b>Mimosaceae</b>				
<i>Acacia bivenosa</i>	*		*	
<i>Acacia gregorii</i>	*	*	*	
<i>Acacia sericophylla</i>	*			*
<i>Acacia spathulata</i>	*	*	*	*
<i>Acacia stellaticeps</i>				*
<i>Acacia tetragonophylla</i>			*	
<b>Molluginaceae</b>				
<i>Mollugo molluginea</i>	*			
<b>Myrtaceae</b>				
<i>Calytrix truncatifolia</i>		*		*
<i>Corymbia zygophylla</i>	*	*	*	*
<i>Melaleuca cardiophylla</i>	*			
<i>Pileanthus septentrionalis</i>		*		*
<i>Verticordia forrestii</i>		*	*	*
<b>Olacaceae</b>				
<i>Olax aurantia</i>		*		*
<b>Papilionaceae</b>				
<i>Chorizema racemosum</i>			*	
<i>Daviesia pleurophylla</i>		*		*
<i>Indigofera boviperda</i> subsp. <i>boviperda</i>	*	*	*	*
<i>Leptosema macrocarpum</i>	*			*

Species	DUNE01	DUNE02	DUNE03	DUNE04
<b>Poaceae</b>				
<i>Eragrostis eriopoda</i>	*	*		*
<i>Eriachne mucronata</i>			*	
<i>Triodia basedowii</i>	*	*	*	*
<i>Triodia schinzii</i>	*	*	*	*
<b>Proteaceae</b>				
<i>Banksia ashbyi</i> subsp. <i>boreoscaia</i>	*	*		*
<i>Grevillea eriostachya</i>	*			*
<i>Grevillea stenobotrya</i>		*	*	*
<i>Hakea stenophylla</i> subsp. <i>stenophylla</i>	*			*
<b>Santalaceae</b>				
<i>Exocarpos sparteus</i>	*	*		
<b>Solanaceae</b>				
<i>Solanum lasiophyllum</i>	*			
<b>Sterculiaceae</b>				
<i>Hannafordia quadrivalvis</i> subsp. <i>recurva</i>	*			
<i>Keraudrenia hermanniifolia</i>		*		*
<b>Thymelaeaceae</b>				
<i>Pimelea ammocharis</i>	*			

## Reference

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## APPENDIX 3 – FLORA

Nomenclature follows Florabase (Western Australian Herbarium 1998).

Definition of Conservation Codes outline in Appendix 7.

\* = introduced taxa

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Acanthaceae</b>				
<i>Dicladantha forrestii</i>			+	+
<i>Dipteracanthus australasicus</i>			+	
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>				+
<i>Dipteracanthus australasicus</i> subsp. <i>corynothecus</i>			+	+
<i>Harnieria kempeana</i> subsp. <i>rhadinophylla</i>		P2	+	
<b>Adiantaceae</b>				
<i>Cheilanthes adiantoides</i>				+
<i>Cheilanthes lasiophylla</i>	Wooly Cloak Fern			+
<b>Amaryllidaceae</b>				
<i>Crinum flaccidum</i>	Native Crinum	P2	+	
<b>Aizoaceae</b>				
<i>Carpobrotus virescens</i>	Coastal Pigface		+	
* <i>Mesembryanthemum crystallinum</i>	Iceplant		+	
<i>Trianthema pilosa</i>				+
<b>Amaranthaceae</b>				
<i>Achyranthes aspera</i>	Chaff Flower		+	
* <i>Aerva javanica</i>	Kapok Bush		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Amaranthus clementii</i>			+	
<i>Amaranthus undulatus</i>			+	
* <i>Amaranthus viridis</i>	Green Amaranth		+	
<i>Hemichroa diandra</i>			+	
<i>Ptilotus astrolasius</i> var. <i>astrolasius</i>				+
<i>Ptilotus axillaris</i>	Mat Mulla Mulla		+	+
<i>Ptilotus clementii</i>	Tassel Top		+	+
<i>Ptilotus divaricatus</i> var. <i>divaricatus</i>			+	+
<i>Ptilotus exaltatus</i>	Tall Mulla Mulla		+	+
<i>Ptilotus gomphrenoides</i>			+	+
<i>Ptilotus murrayi</i>			+	
<i>Ptilotus obovatus</i>	Cotton Bush		+	+
	Prince of Wales			+
<i>Ptilotus polystachyus</i>	Feather			
<i>Ptilotus villosiflorus</i>			+	
<b>Apiaceae</b>				
<i>Daucus glochidiatus</i>	Australian Carrot			+
<b>Asclepiadaceae</b>				
<i>Cynanchum floribundum</i>	Dumara Bush		+	+
<i>Rhyncharrhena linearis</i>	Bush Bean			+
<i>Sarcostemma viminale</i> subsp. <i>australe</i>			+	+
<i>Tylophora flexuosa</i>			+	+
<b>Asparagaceae</b>				
<i>Murchisonia volubilis</i>			+	
<i>Thysanotus patersonii</i>				+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Asphodelaceae</b>				
<i>*Asphodelus fistulosus</i>	Onion Weed		+	+
<b>Asteraceae</b>				
	Hook-leaf		+	+
<i>Angianthus acrohyalinus</i>	Angianthus			
	Cone-spike		+	
<i>Angianthus milnei</i>	Angianthus			
	Bipinnate		+	
<i>*Bidens bipinnata</i>	Beggartick		+	+
<i>Brachyscome ciliocarpa</i>			+	+
<i>Brachyscome oncocarpa</i>				+
<i>Chrysocephalum apiculatum</i>				+
<i>*Flaveria trinervia</i>	Speedy Weed		+	
<i>Helichrysum luteoalbum</i>	Jersey Cudweed		+	
<i>Launaea sarmentosa</i>				+
<i>Minuria cunninghamii</i>	Bush Minuria		+	
<i>Minuria leptophylla</i>	Minnie Daisy			+
	Coastal		+	
<i>Olearia axillaris</i>	Daisybush			
<i>Olearia dampieri</i> subsp. <i>dampieri</i>			+	+
<i>Peripleura arida</i>			+	+
<i>Peripleura hispidula</i> var. <i>setosa</i>				+
<i>Peripleura obovata</i>			+	
<i>Pluchea dentex</i>			+	+
<i>Pluchea dunlopia</i>			+	
<i>Pluchea ferdinandi-muelleri</i>				+
<i>Pluchea rubelliflora</i>			+	+
<i>Pluchea</i> sp. B Kimberley Flora			+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
(K.F. Kenneally 9526A)				
<i>Podolepis canescens</i>			+	+
<i>Pterocaulon sphaeranthoides</i>			+	+
<i>Rhodanthe floribunda</i>				+
<i>Rhodanthe humboldtiana</i>			+	
<i>Rhodanthe psammophila</i>			+	
<i>Rhodanthe stricta</i>				+
<i>Senecio hamersleyensis</i>			+	+
<i>Senecio magnificus</i>	Showy Groundsel		+	
<i>Senecio pinnatifolius</i>			+	
* <i>Sigesbeckia orientalis</i>	Indian Weed		+	+
	Common		+	+
* <i>Sonchus oleraceus</i>	Sowthistle		+	+
<i>Streptoglossa bubakii</i>			+	
<i>Streptoglossa decurrens</i>			+	+
<i>Streptoglossa liatroides</i>				+
<i>Streptoglossa macrocephala</i>				+
<b>Avicenniaceae</b>				
<i>Avicennia marina</i>	White Mangrove		+	
<b>Boraginaceae</b>				
<i>Cynoglossum drummondii</i>				+
<i>Halgania cyanea</i>	Rough Halgania		+	
<i>Halgania cyanea</i> var. Allambi Stn (B.W. Strong 676)			+	+
<i>Heliotropium crispatum</i>			+	+
<i>Heliotropium glanduliferum</i>				+
<i>Trichodesma zeylanicum</i>	Camel Bush		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Brassicaceae</b>				
<i>Lepidium muelleri-ferdinandii</i>				+
	Slender			
<i>Lepidium platypetalum</i>	Peppercress		+	
<b>Caesalpiniaceae</b>				
<i>Labichea cassioides</i>				+
	Slender			
<i>Petalostylis labicheoides</i>	Petalostylis			+
<i>Senna artemisioides</i> subsp. <i>helmsii</i>				+
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>			+	+
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>glutinosa</i>			+	
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>			+	
<i>Senna ferraria</i>				+
<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>			+	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>			+	+
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>			+	+
<i>Senna notabilis</i>			+	+
<b>Campanulaceae</b>				
<i>Wahlenbergia communis</i>	Native Bluebell		+	
<b>Capparaceae</b>				
<i>Capparis lasiantha</i>	Split Jack		+	+
<i>Capparis mitchellii</i>	Wild Orange			+
<i>Capparis spinosa</i>	Coastal Caper		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Caryophyllaceae</b>				
<i>*Polycarpon tetraphyllum</i>	Four-leaf Allseed		+	
<b>Celastraceae</b>				
<i>Stackhousia muricata</i>			+	+
<i>Stackhousia umbellata</i>		P3	+	+
<b>Chenopodiaceae</b>				
<i>Atriplex bunburyana</i>	Silver Saltbush		+	+
	Flat-topped			+
<i>Atriplex codonocarpa</i>	Saltbush			
<i>Atriplex isatidea</i>	Coast Saltbush		+	
<i>Atriplex semilunaris</i>	Annual Saltbush		+	
<i>Chenopodium gaudichaudianum</i>	Cottony Saltbush		+	+
	Nettle-leaf			
<i>*Chenopodium murale</i>	Goosefoot		+	
<i>Dissocarpus paradoxus</i>	Curious Saltbush			+
	Crested			
<i>Dysphania cristata</i>	Goosefoot			+
<i>Dysphania melanocarpa</i> forma <i>leucocarpa</i>			+	
<i>Dysphania plantaginella</i>			+	
<i>Enchylaena tomentosa</i>	Barrier Saltbush		+	+
<i>Eremophea spinosa</i>			+	
<i>Maireana integra</i>			+	
<i>Maireana planifolia</i>	Low Bluebush		+	
	Gascoyne			
<i>Maireana polypterygia</i>	Bluebush		+	+
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	Felty Bluebush		+	
<i>Neobassia astrocarpa</i>			+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Rhagodia baccata</i>	Berry Saltbush		+	+
<i>Rhagodia eremaea</i>	Thorny Saltbush		+	
<i>Rhagodia latifolia</i>			+	
<i>Rhagodia preissii</i> subsp. <i>obovata</i>			+	+
<i>Salsola australis</i>			+	
	Two-spined			
<i>Sclerolaena uniflora</i>	Saltbush		+	
	Shrubby			
<i>Tecticornia halocnemoides</i>	Samphire		+	
<i>Tecticornia pruinosa</i>			+	
<i>Tecticornia pterygosperma</i> subsp. <i>denticulata</i>			+	
<i>Threlkeldia diffusa</i>	Coastal Bonefruit		+	
<b>Cleomaceae</b>				
<i>Cleome viscosa</i>	Tickweed		+	+
<b>Colchicaceae</b>				
<i>Wurmbea odorata</i>			+	+
<b>Commelinaceae</b>				
<i>Commelina ensifolia</i>	Wandering Jew		+	+
<b>Convolvulaceae</b>				
<i>Convolvulus angustissimus</i>			+	
<i>Duperreya commixta</i>				+
<i>Evolvulus alsinoides</i>				+
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>			+	+
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>			+	+
<i>Ipomoea costata</i>	Rock Morning		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
	Glory			
	Poison Morning			
<i>Ipomoea muelleri</i>	Glory		+	+
<i>Ipomoea polymorpha</i>				+
	Yardie Morning			
<i>Ipomoea yardiensis</i>	Glory		+	+
<i>Polymeria ambigua</i>	Morning Glory		+	+
<b>Crassulaceae</b>				
<i>Crassula colorata</i> var. <i>colorata</i>				+
<b>Cucurbitaceae</b>				
<i>Cucumis maderaspatanus</i>			+	+
<b>Cyperaceae</b>				
<i>Bulbostylis barbata</i>				+
<i>Cyperus squarrosus</i>			+	
<i>Cyperus vaginatus</i>	Stiffleaf Sedge		+	
<i>Schoenoplectus subulatus</i>			+	
<b>Dasypogonaceae</b>				
<i>Acanthocarpus humilis</i>			+	+
<i>Acanthocarpus preissii</i>			+	
<i>Acanthocarpus robustus</i>			+	+
<i>Acanthocarpus rupestris</i>		P2	+	
<i>Acanthocarpus verticillatus</i>			+	+
<b>Dilleniaceae</b>				
<i>Hibbertia spicata</i> subsp. <i>spicata</i>			+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Emblingiaceae</b>				
<i>Emblingia calceoliflora</i>			+	
<b>Euphorbiaceae</b>				
<i>Adriana tomentosa</i> var. <i>tomentosa</i>			+	+
<i>Adriana urticoides</i> var. <i>urticoides</i>				+
<i>Beyeria cinerea</i> subsp. <i>borealis</i>			+	
<i>Euphorbia alsiniflora</i>			+	
<i>Euphorbia atoto</i>	Miri-miri		+	+
<i>Euphorbia australis</i>	Namana		+	
<i>Euphorbia biconvexa</i>			+	
<i>Euphorbia coghlanii</i>	Namana		+	
<i>Euphorbia drummondii</i>	Caustic Weed			+
<i>Euphorbia tannensis</i>			+	+
<i>Mallotus nesophilus</i>			+	
<i>Phyllanthus erwinii</i>			+	
<i>Phyllanthus maderaspatensis</i>			+	+
<i>Phyllanthus</i> sp. Coastal North West (J.Z. Weber 4919)			+	+
<b>Frankeniaceae</b>				
<i>Frankenia ambita</i>			+	
<b>Gentianaceae</b>				
<i>Centaurium spicatum</i>	Spike Centaury			+
<b>Geraniaceae</b>				
<i>Erodium botrys</i>	Long Storksbill		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Erodium cygnorum</i>	Blue Heronsbill		+	+
<b>Goodeniaceae</b>				
<i>Dampiera incana</i> var. <i>incana</i>			+	+
<i>Goodenia cusackiana</i>			+	
<i>Goodenia forrestii</i>			+	
<i>Goodenia microptera</i>				+
<i>Goodenia prostrata</i>			+	+
<i>Goodenia tenuiloba</i>			+	+
<i>Lechenaultia subcymosa</i>			+	+
<i>Scaevola anchusifolia</i>			+	
<i>Scaevola cunninghamii</i>			+	+
<i>Scaevola pulchella</i>				+
<i>Scaevola sericophylla</i>				+
<i>Scaevola spinescens</i>	Currant Bush		+	
	Raggedleaf			
<i>Scaevola tomentosa</i>	Fanflower		+	+
<b>Gyrostemonaceae</b>				
<i>Gyrostemon ramulosus</i>	Corkybark		+	+
<b>Haloragaceae</b>				
<i>Haloragis gossei</i>				+
<b>Hemerocallidaceae</b>				
<i>Corynotheca flexuosissima</i>				+
<i>Corynotheca micrantha</i>			+	
<i>Tricoryne corynothecoides</i>				+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Hydrocharitaceae</b>				
<i>Najas marina</i>	Prickly Water Nymph		+	
<b>Lamiaceae</b>				
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>			+	+
<i>Pityrodia loxocarpa</i>				+
<i>Plectranthus intraterraneus</i>			+	+
<i>Spartothamnella teucriflora</i>			+	
<b>Lauraceae</b>				
<i>Cassytha aurea</i> var. <i>aurea</i>				+
<i>Cassytha capillaris</i>			+	
<i>Cassytha racemosa</i> forma <i>pilosa</i>	Dodder Laurel		+	
<b>Loganiaceae</b>				
<i>Logania litoralis</i>			+	+
<i>Logania vaginalis</i>	White Spray			+
<b>Loranthaceae</b>				
<i>Amyema benthamii</i>			+	+
<i>Amyema fitzgeraldii</i>	Pincushion Mistletoe		+	+
<i>Amyema miquelii</i>	Stalked Mistletoe		+	+
<i>Amyema miraculosa</i> subsp. <i>miraculosa</i>			+	
<i>Amyema preissii</i>	Wireleaf Mistletoe		+	+
<i>Amyema sanguinea</i> var. <i>sanguinea</i>			+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Malvaceae</b>				
<i>Abutilon cunninghamii</i>			+	+
<i>Abutilon dioicum</i>				+
<i>Abutilon indicum</i> var. <i>australiense</i>			+	
<i>Abutilon lepidum</i>			+	+
	Desert Chinese			
<i>Abutilon otocarpum</i>	Lantern		+	
<i>Abutilon</i> sp. Cape Range (A.S. George 1312)		P2	+	+
<i>Abutilon</i> sp. Hamelin (A.M. Ashby 2196)		P2	+	
<i>Alyogyne cuneiformis</i>	Coastal Hibiscus		+	+
<i>Alyogyne pinoniana</i>	Sand Hibiscus		+	
<i>Corchorus carnarvonensis</i>			+	
<i>Corchorus congener</i>		P3	+	+
<i>Corchorus crozophorifolius</i>			+	+
<i>Corchorus elachocarpus</i>				+
<i>Gossypium australe</i>	Native Cotton		+	
<i>Gossypium robinsonii</i>	Wild Cotton		+	+
	Sturt's Desert			
<i>Gossypium sturtianum</i>	Rose		+	
<i>Gossypium sturtianum</i> var. <i>sturtianum</i>			+	+
<i>Hibiscus</i> aff. <i>solanifolius</i>				+
<i>Hibiscus coatesii</i>				+
<i>Hibiscus gardneri</i>				+
<i>Hibiscus goldsworthii</i>				+
<i>Hibiscus leptocladus</i>				+
<i>Hibiscus sturtii</i> var. <i>platychlamys</i>				+
<i>Lawrencia viridigrisea</i>			+	
	Spiked			
* <i>Malvastrum americanum</i>	Malvastrum		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Sida</i> aff. <i>corrugata</i>				+
<i>Sida calyxhymenia</i>	Tall Sida		+	
<i>Sida fibulifera</i>	Silver Sida		+	+
<i>Sida kingii</i>			+	
<i>Sida rohlenae</i>			+	
<i>Sida spinosa</i>	Spiny Sida			+
<b>Menispermaceae</b>				
<i>Tinospora esiangkara</i>		P2	+	+
<b>Mimosaceae</b>				
<i>Acacia alexandri</i>		P3	+	+
<i>Acacia arida</i>			+	+
<i>Acacia bivenosa</i>			+	+
<i>Acacia bivenosa x sclerosperma</i>			+	
<i>Acacia</i> cf. <i>coolgardiensis</i>			+	
<i>Acacia coriacea</i>	Wirewood		+	+
<i>Acacia gregorii</i>	Gregory's Wattle		+	+
<i>Acacia pyrifolia</i>	Ranji Bush		+	+
<i>Acacia ryaniana</i>		P2	+	
<i>Acacia sclerosperma</i>	Limestone Wattle		+	+
<i>Acacia sericophylla</i>			+	+
<i>Acacia spathulifolia</i>			+	+
<i>Acacia startii</i>		P3	+	
<i>Acacia stellaticeps</i>				+
<i>Acacia synchronicia</i>			+	+
<i>Acacia tetragonophylla</i>	Kurara		+	+
<i>Acacia trachycarpa</i>	Minni Ritchi		+	
<i>Vachellia farnesiana</i>	Mimosa Bush		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Molluginaceae</b>				
<i>Mollugo molluginea</i>				+
<b>Moraceae</b>				
<i>Ficus brachypoda</i>			+	+
<i>Ficus virens</i> var. <i>virens</i>			+	+
<b>Myoporaceae</b>				
<i>Eremophila forrestii</i> subsp. <i>capensis</i>		P3	+	+
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>			+	+
<i>Eremophila longifolia</i>	Berrigan		+	+
<i>Eremophila maculata</i> subsp. <i>brevifolia</i>	Native Fuchsia		+	+
<i>Eremophila occidentis</i>		P2	+	
<i>Myoporum montanum</i>	Native Myrtle		+	
<b>Myrtaceae</b>				
<i>Calytrix truncatifolia</i>			+	+
<i>Corymbia hamersleyana</i>			+	+
<i>Corymbia opaca</i>			+	+
<i>Corymbia zygophylla</i>				+
<i>Eucalyptus baiophylla</i>			+	
<i>Eucalyptus prominens</i>			+	+
<i>Eucalyptus ultima</i>			+	+
<i>Eucalyptus victrix</i>				+
<i>Eucalyptus xerothermica</i>			+	+
<i>Melaleuca bracteata</i>	River Teatree		+	
	Tangling			
<i>Melaleuca cardiophylla</i>	Melaleuca		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Pileanthus septentrionalis</i>				+
<i>Thryptomene baeckeacea</i>			+	+
<i>Verticordia forrestii</i>	Forrest's Featherflower		+	+
<i>Verticordia serotina</i>		P2	+	
<b>Nyctaginaceae</b>				
<i>Boerhavia coccinea</i>	Tar Vine		+	
	Perennial Tar		+	
<i>Commicarpus australis</i>	Vine		+	
<b>Olacaceae</b>				
<i>Olox aurantia</i>			+	+
<b>Oleaceae</b>				
<i>Jasminum didymum</i> subsp. <i>lineare</i>			+	
<i>Jasminum</i> sp. Exmouth (G. Marsh 77)			+	+
<b>Ophioglossaceae</b>				
<i>Ophioglossum gramineum</i>				+
<i>Ophioglossum lusitanicum</i>	Adder's Tongue		+	
<b>Orobanchaceae</b>				
<i>Striga squamigera</i>			+	+
<b>Papaveraceae</b>				
* <i>Argemone ochroleuca</i>	Mexican Poppy		+	
<b>Papilionaceae</b>				

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Chorizema racemosum</i>				+
<i>Crotalaria cunninghamii</i>	Green Birdflower		+	+
* <i>Crotalaria incana</i> subsp. <i>incana</i>			+	
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>			+	+
<i>Cullen leucanthum</i>			+	
<i>Cullen pogonocarpum</i>			+	+
<i>Daviesia pleurophylla</i>		P2	+	+
<i>Erythrina vespertilio</i>	Yulbah		+	+
<i>Glycine canescens</i>	Silky Glycine			+
<i>Indigofera boviperda</i> subsp. <i>boviperda</i>			+	+
<i>Indigofera chamaeclada</i>				+
<i>Indigofera linifolia</i>			+	
<i>Indigofera monophylla</i>			+	+
<i>Indigofera trita</i>				+
<i>Isotropis atropurpurea</i>	Poison Sage		+	+
<i>Leptosema macrocarpum</i>			+	+
<i>Lotus australis</i>	Austral Trefoil		+	+
<i>Mirbelia ramulosa</i>				+
<i>Mirbelia</i> sp. Carnarvon (J.S. Beard 6008)			+	
<i>Rhynchosia bungarensis</i>		P3	+	
<i>Rhynchosia minima</i>	Rhynchosia		+	+
<i>Stylosanthes hamata</i>	Verano Stylo		+	
<i>Swainsona complanata</i>			+	
<i>Swainsona formosa</i>			+	+
<i>Swainsona kingii</i>			+	+
<i>Swainsona leeana</i>			+	
<i>Swainsona pterostylis</i>			+	+
	Flinders River			
<i>Tephrosia rosea</i>	Poison		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Vigna lanceolata</i>	Maloga Wigna		+	
<b>Phrymaceae</b>				
<i>Mimulus gracilis</i>			+	
<b>Pittosporaceae</b>				
<i>Pittosporum phylliraeoides</i>	Weeping Pittosporum		+	+
<b>Plantaginaceae</b>				
<i>Stemodia grossa</i>	Marsh Stemodia		+	+
<i>Stemodia viscosa</i>	Pagurda		+	
<b>Plumbaginaceae</b>				
<i>Muellerolimon salicorniaceum</i>			+	
<i>Plumbago zeylanica</i>	Native Plumbago		+	+
<b>Poaceae</b>				
<i>Aristida anthoxanthoides</i>	Yellow Threawn Bunched		+	
<i>Aristida contorta</i>	Kerosene Grass		+	+
<i>Aristida holathera</i> var. <i>holathera</i>			+	
<i>Bothriochloa ewartiana</i>	Desert Bluegrass			+
* <i>Cenchrus ciliaris</i>	Buffel Grass		+	+
<i>Cymbopogon ambiguus</i>	Scentgrass		+	+
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>				+
<i>Digitaria ctenantha</i>	Comb Finger Grass		+	
* <i>Echinochloa colona</i>	Awnless Barnyard		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
	Grass			
<i>Enneapogon caerulescens</i>	Limestone Grass		+	+
<i>Enneapogon lindleyanus</i>	Wiry Nineawn		+	+
	Cuming's Love			+
<i>Eragrostis cumingii</i>	Grass			
<i>Eragrostis eriopoda</i>	Woolybutt Grass		+	+
<i>Eriachne aristidea</i>				+
	Buck Wanderrie			+
<i>Eriachne helmsii</i>	Grass			
	Mountain			
<i>Eriachne mucronata</i>	Wanderrie Grass		+	+
	Northern			+
<i>Eriachne obtusa</i>	Wanderrie Grass			
<i>Eulalia aurea</i>				+
<i>Iseilema dolichotrichum</i>				+
	Northern Mulga			+
<i>Paraneurachne muelleri</i>	Grass			
	Clement's			
<i>Paspalidium clementii</i>	Paspalidium		+	+
<i>Paspalidium tabulatum</i>			+	+
	Diels' Pigeon			+
<i>Setaria dielsii</i>	Grass			
	Whorled Pigeon			
<i>*Setaria verticillata</i>	Grass		+	
<i>Spinifex longifolius</i>	Beach Spinifex		+	
<i>Sporobolus virginicus</i>	Marine Couch		+	
<i>Themeda triandra</i>			+	
<i>Triodia angusta</i>			+	+
<i>Triodia basedowii</i>	Lobed Spinifex		+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Triodia epactia</i>			+	+
<i>Triodia schinzii</i>			+	+
	Limestone			
<i>Triodia wiseana</i>	Spinifex		+	+
<i>Triraphis mollis</i>	Needle Grass			+
<b>Polygonaceae</b>				
<i>Emex australis</i>	Doublegee		+	
<b>Portulacaceae</b>				
<i>Calandrinia ptychosperma</i>			+	
<i>Calandrinia remota</i>			+	
<i>Portulaca oleracea</i>	Purslane			+
<b>Primulaceae</b>				
<i>Samolus</i> sp. Shark Bay (M.E. Trudgen 7410)			+	
<b>Proteaceae</b>				
<i>Banksia ashbyi</i> subsp. <i>boreoscaia</i>			+	+
<i>Grevillea calcicola</i>		P3	+	+
<i>Grevillea eriostachya</i>	Flame Grevillea		+	+
<i>Grevillea gordoniana</i>			+	+
<i>Grevillea stenobotrya</i>			+	+
<i>Grevillea variifolia</i> subsp. <i>variifolia</i>			+	+
<i>Hakea lorea</i> subsp. <i>lorea</i>			+	+
<i>Hakea stenophylla</i> subsp. <i>stenophylla</i>			+	+
<b>Rhizophoraceae</b>				
<i>Rhizophora stylosa</i>	Spotted-leaved		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
	Red Mangrove			
<b>Rubiaceae</b>				
<i>Oldenlandia crouchiana</i>			+	+
<i>Psydrax ammophila / latifolia</i>				+
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>			+	
<b>Rutaceae</b>				
<i>Diplolaena grandiflora</i>	Wild Rose		+	+
<b>Santalaceae</b>				
<i>Exocarpos aphyllus</i>	Leafless Ballart		+	+
<i>Exocarpos sparteus</i>	Broom Ballart		+	+
	Northern			
<i>Santalum lanceolatum</i>	Sandalwood		+	+
<i>Santalum spicatum</i>	Sandalwood		+	
<b>Sapindaceae</b>				
<i>Alectryon oleifolius</i> subsp. <i>oleifolius</i>			+	+
	Hairy			
<i>Diplopeltis eriocarpa</i>	Pepperflower		+	+
<i>Diplopeltis intermedia</i>			+	+
	Grey			
<i>Diplopeltis intermedia</i> var. <i>intermedia</i>	Pepperflower		+	
<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>			+	+
<b>Solanaceae</b>				
	Native			
* <i>Datura leichhardtii</i>	Thornapple		+	

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<i>Duboisia hopwoodii</i>	Pituri			+
* <i>Nicotiana glauca</i>	Tree Tobacco		+	
<i>Nicotiana occidentalis</i>	Native Tobacco			+
<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>			+	
<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>			+	+
<i>Solanum diversiflorum</i>			+	+
<i>Solanum ellipticum</i>	Potato Bush		+	+
<i>Solanum lasiophyllum</i>	Flannel Bush		+	+
	Blackberry		+	
* <i>Solanum nigrum</i>	Nightshade		+	
<i>Solanum phlomoides</i>			+	
<b>Sterculiaceae</b>				
<i>Brachychiton gregorii</i>	Desert Kurrajong		+	
<i>Brachychiton obtusilobus</i>		P4	+	+
<i>Hannafordia quadrivalvis</i> subsp. <i>recurva</i>			+	+
<i>Keraudrenia hermanniifolia</i>			+	+
<i>Melhania oblongifolia</i>			+	+
	Yellow flowered		+	+
<i>Rulingia luteiflora</i>	Rulingia		+	+
<i>Waltheria indica</i>				+
<b>Surianaceae</b>				
<i>Stylobasium spathulatum</i>	Pebble Bush		+	+
<b>Thymelaeaceae</b>				
<i>Pimelea ammocharis</i>			+	+
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>			+	+

Species	Common Name	Conservation CodeStatus	CRNP	UCL
<b>Typhaceae</b>				
<i>Typha domingensis</i>	Bulrush		+	
<b>Urticaceae</b>				
<i>Parietaria cardiostegia</i>			+	+
<b>Violaceae</b>				
<i>Hybanthus aurantiacus</i>			+	+
<i>Hybanthus enneaspermus</i>				+
<b>Zygophyllaceae</b>				
<i>Tribulus hirsutus</i>				+
<i>Tribulus macrocarpus</i>			+	+
<i>Tribulus occidentalis</i>	Perennial Caltrop		+	+
<i>Tribulus platypterus</i>	Cork Hopbush		+	
<i>Tribulus suberosus</i>			+	+
<i>Zygophyllum aurantiacum</i>	Shrubby Twinleaf		+	
<i>Zygophyllum fruticosum</i>	Shrubby Twinleaf		+	

## APPENDIX 4 – REPTILES

Definition of Conservation Codes outline in Appendix 7. Taxonomy and nomenclature follow

Species	Common Name	Conservation Status	CRNP	UCL
<b>Agamidae</b>				
<i>Amphibolurus gilberti</i> subsp. <i>gilberti</i>				+
<i>Amphibolurus longirostris</i>				+
<i>Ctenophorus femoralis</i>	Dune Dragon			+
<i>Ctenophorus isolepis</i> subsp. <i>isolepis</i>			+	+
<i>Ctenophorus nuchalis</i>	Central Netted Dragon		+	+
	Western Heath		+	+
<i>Ctenophorus parviceps</i>	Dragons			
<i>Diporiphora winneckeii</i>				+
<i>Pogona minor</i> subsp. <i>minor</i>			+	+
<b>Boidae</b>				
<i>Antaresia perthensis</i>	Pygmy Python		+	+
<i>Antaresia stimsoni</i> subsp. <i>stimsoni</i>				+
<i>Aspidites melanocephalus</i>	Black-headed Python			+
<b>Carphodactylidae</b>				
<i>Nephrurus levis</i> subsp. <i>occidentalis</i>			+	+
<b>Elapidae</b>				
<i>Acanthophis wellsi</i>	Pilbara Death Adder		+	+
<i>Brachyuropsis approximans</i>				+
<i>Demansia calodera</i>	Black-necked Whipsnake		+	+
<i>Furina ornata</i>	Moon Snake			+
<i>Pseudechis australis</i>	Mulga Snake		+	

Species	Common Name	Conservation Status	CRNP	UCL
<i>Pseudonaja nuchalis</i>	Gwardar			+
<i>Pseudonaja modesta</i>	Ringed Brown Snake		+	
<i>Simoselaps bertholdi</i>	Jan's Banded Snake			+
<i>Simoselaps littoralis</i>	West Coast Banded Snake		+	
<i>Suta fasciata</i>	Rosen's Snake			+
<b>Gekkonidae</b>				
<i>Crenadactylus ocellatus</i> subsp. <i>horni</i>			+	+
<i>Diplodactylus capensis</i>	Cape Range Stone Gecko	P2	+	+
<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko			+
<i>Diplodactylus ornatus</i>				+
<i>Diplodactylus stenodactylus</i>				+
<i>Gehyra sp. nov</i>			+	+
<i>Gehyra punctata</i>				+
<i>Gehyra variegata</i>			+	+
<i>Heteronotia binoei</i>	Bynoe's Gecko		+	+
<i>Lucasium stenodactylum</i>				+
<i>Strophurus ciliaris</i> subsp. <i>aberrans</i>			+	+
<i>Strophurus eldero</i>			+	
<i>Strophurus jeanae</i>				+
<i>Strophurus rankini</i>				+
<i>Strophurus strophurus</i>			+	+
<b>Pygopodidae</b>				
<i>Aprasia rostrata</i>		T	+	+
<i>Delma australis</i>			+	
<i>Delma nasuta</i>				+

Species	Common Name	Conservation Status	CRNP	UCL
<i>Delma tealei</i>			+	+
<i>Delma tincta</i>				+
<i>Lialis burtonis</i>			+	+
<i>Pygopus nigriceps</i>				+
<b>Scincidae</b>				
<i>Carlia munda</i>			+	+
<i>Cryptoblepharus plagiocephalus</i>			+	+
<i>Ctenotus duricola</i>			+	
<i>Ctenotus grandis</i> subsp. <i>titan</i>			+	+
<i>Ctenotus hanloni</i>				+
<i>Ctenotus iapetus</i>			+	+
<i>Ctenotus pantherinus</i> subsp. <i>ocellifer</i>			+	+
<i>Ctenotus rufescens</i>				+
<i>Ctenotus saxatilis</i>	Rock Ctenotus		+	+
<i>Cyclodomorphus melanops</i> subsp. <i>melanops</i>			+	+
<i>Eremiascincus fasciolatus</i>	Narrow-banded Sand Swimmer			+
<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer			+
<i>Egernia</i> sp. nov.				+
<i>Lerista allochira</i>		P3	+	
<i>Lerista bipes</i>			+	+
<i>Lerista clara</i>			+	+
<i>Lerista elegans</i>			+	+
<i>Lerista lineopunctulata</i>			+	+
<i>Lerista macropisthopus</i> subsp. <i>fusciceps</i>			+	+

Species	Common Name	Conservation Status	CRNP	UCL
<i>Lerista planiventralis</i> subsp.				
<i>planiventralis</i>			+	+
<i>Lerista praepedita</i>			+	
<i>Lerista uniduo</i>			+	
<i>Menetia greyii</i>				+
<i>Menetia surda</i>			+	+
<i>Morethia lineoocellata</i>			+	
<i>Morethia ruficauda</i> subsp. <i>exquisita</i>			+	+
<i>Notoscincus ornatus</i> subsp. <i>ornatus</i>				+
<i>Tiliqua multifasciata</i>	Central Blue-tongue		+	
<b>Typhlopidae</b>				
<i>Ramphotyphlops grypus</i>			+	+
<i>Ramphotyphlops hamatus</i>				+
<i>Ramphotyphlops splendidus</i>		P2	+	
<b>Varanidae</b>				
<i>Varanus acanthurus</i>	Spiny-tailed Monitor		+	+
<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor			+
<i>Varanus giganteus</i>	Perentie			+
<i>Varanus eremius</i>				+
<i>Varanus gouldii</i> subsp. <i>gouldii</i>				+

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## APPENDIX 5 – AMPHIBIANS

Species	Common Name	Conservation Status	CRNP	UCL
<b>Hylidae</b>				
<i>Cyclorana maini</i>	Sheep Frog		+	+
<i>Litoria rubella</i>	Desert Tree Frog		+	
<b>Limnodynastidae</b>				
<i>Neobatrachus fulvus</i>	Tawny Trilling Frog			+
<b>Myobatrachidae</b>				
<i>Pseudophryne douglasi</i>	Gorge Toadlet		+	+

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## APPENDIX 6 – MAMMALS

Definition of Conservation Codes outline in Appendix 7

Species	Common Name	Conservation Status	CRNP	UCL
<b>Canidae</b>				
<i>Canis familiaris</i>	Dog			+
<b>Dasyuridae</b>				
<i>Dasykaluta rosamondae</i>	Little Red Kaluta		+	
<i>Ningaiu timealeyi</i>	Pilbara Ningai		+	
<i>Pseudantechinus roryi</i>	Rory's Pseudantechinus		+	
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart		+	+
<i>Sminthopsis youngsoni</i>	Lesser Hair-footed Dunnart			+
<b>Emballonuridae</b>				
<i>Taphozous georgianus</i>	Common Sheath-tail-bat		+	+
<b>Felidae</b>				
<i>Felis catus</i>	Cat			+
<b>Macropodidae</b>				
<i>Macropus robustus</i> subsp. <i>erubescens</i>	Euro, Biggada		+	+
<i>Macropus rubus</i>	Red Kangaroo, Marlu		+	
<i>Petrogale lateralis</i> subsp. <i>lateralis</i>	Black-footed Rock-wallaby	T	+	+
<b>Molossidae</b>				
<i>Tadarida australis</i>	White-striped Freetail-bat			+
<b>Muridae</b>				

<i>Mus musculus</i>	House Mouse	+	+
<i>Notomys alexis</i>	Spinifex Hopping-mouse	+	+
<i>Pseudomys delicatulus</i>	Delicate Mouse		+
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	+	+
<i>Rattus rattus</i>	Black Rat	+	+
<b>Tachyglossidae</b>			
<i>Tachyglossus aculeatus</i>	Short beaked Echidna	+	+
<b>Vespertilionidae</b>			
<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat		+

## APPENDIX 7 – BIRDS

Species	Common Name	Conservation Status	CRNP	UCL
<b>CASUARIIFORMES</b>				
<b>Casuariidae</b>				
<i>Dromaius novaehollandiae</i>	Emu		+	+
<b>ANSERIFORMES</b>				
<b>Anatidae</b>				
<i>Anas gracilis</i>	Grey Teal		+	
<i>Anas superciliosa</i>	Pacific Black Duck		+	
<i>Chenonetta jubata</i>	Australian Wood Duck			
<i>Cygnus atratus</i>	Black Swan		+	
<i>Tadorna tadornoides</i>	Australian Shelduck		+	
<b>PHAETHONTIFORMES</b>				
<b>Phaethontidae</b>				
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird		+	

Species	Common Name	Conservation Status	CRNP	UCL
<b>PODICIPEDIFORMES</b>				
<b>Podicipedidae</b>				
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe		+	
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		+	
<b>PHOENICOPTERIFORMES</b>				
<b>Columbidae</b>				
<i>Geopelia cuneata</i>	Diamond Dove		+	
<i>Geopelia humeralis</i>	Bar-shouldered Dove		+	
<i>Geopelia striata</i>	Peaceful Dove		+	
<i>Geophaps plumifera</i>	Spinifex Pigeon		+	+
<i>Ocyphaps lophotes</i>	Crested Pigeon		+	+
<b>CAPRIMULGIFORMES</b>				
<b>Podargidae</b>				
<i>Podargus strigoides</i>	Tawny Frogmouth		+	
<b>APODIFORMES</b>				
<b>Aegothelidae</b>				
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		+	+
<b>PROCELLARIFORMES</b>				
<b>Hydrobatidae</b>				
<i>Pelagodroma marina</i>	White-faced Storm-Petrel		+	
<b>Oceanitidae</b>				
<i>Oceanites oceanicus</i>	Wilson's Storm-Petrel	IA	+	

Species	Common Name	Conservation Status	CRNP	UCL
<b>Diomedeidae</b>				
<i>Thalassarche chlororhynchos</i>	Yellow-nosed Albatross		+	
<b>Procellariidae</b>				
<i>Ardenna carneipes</i>	Flesh-footed Shearwater		+	
<i>Ardenna pacifica</i>	Wedge-tailed Shearwater		+	
<i>Daption capense</i>	Cape Petrel		+	
<i>Puffinus assimilus</i>	Little Shearwater		+	
<i>Puffinus huttoni</i>	Hutton's Shearwater		+	
<i>Pterodroma macroptera</i>	Great-winged Petrel		+	
<i>Pterodroma mollis</i>	Soft-plumaged Petrel		+	
<b>PHALACROCORACIFORMES</b>				
<b>Fregatidae</b>				
<i>Fregata ariel</i>	Lesser Frigatebird	IA	+	
<b>Sulidae</b>				
<i>Anhinga novaehollandiae</i>	Australasian Darter			
<i>Morus serrator</i>	Australasian Gannet		+	
<i>Sula leucogaster</i>	Brown Booby	IA	+	
<b>Phalacrocoracidae</b>				
<i>Phalacrocorax carbo</i>	Great Cormorant			
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		+	
<i>Phalacrocorax varius</i>	Pied Cormorant		+	
<b>CICONIIFORMES</b>				
<b>Pelecanidae</b>				
<i>Pelecanus conspicillatus</i>	Australian Pelican		+	

Species	Common Name	Conservation Status	CRNP	UCL
<b>Ardeidae</b>				
<i>Butorides striata</i>	Striated Heron		+	+
<i>Egretta garzetta</i>	Little Egret		+	
<i>Egretta novaehollandiae</i>	White-faced Heron		+	
<i>Egretta sacra</i>	Eastern Reef Egret	IA	+	
<i>Ixobrychus flavicollis</i>	Black Bittern		+	
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron		+	
<b>Threskiornithidae</b>				
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		+	
<b>ACCIPITRIFORMES</b>				
<b>Accipitridae</b>				
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk		+	
<i>Accipiter fasciatus</i>	Brown Goshawk			+
<i>Aquila audax</i>	Wedge-tailed Eagle		+	+
<i>Circus assimilis</i>	Spotted Harrier		+	
<i>Elanus axillaris</i>	Black-shouldered Kite		+	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		+	
<i>Haliastur indus</i>	Brahminy Kite		+	
<i>Haliastur sphenurus</i>	Whistling Kite		+	
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard			
<i>Hieraaetus morphnoides</i>	Little Eagle		+	
<i>Lophoictinia isura</i>	Square-tailed Kite		+	
<i>Milvus migrans</i>	Black Kite		+	
<i>Pandion haliaetus</i>	Osprey		+	+
<b>FALCONIFORMES</b>				

Species	Common Name	Conservation Status	CRNP	UCL
<b>Falconidae</b>				
<i>Falco berigora</i>	Brown Falcon		+	
<i>Falco cenchroides</i>	Nankeen Kestrel		+	+
<i>Falco longipennis</i>	Australian Hobby		+	
<i>Falco peregrinus</i>	Peregrine Falcon	S	+	
<b>GRUIFORMES</b>				
<b>Rallidae</b>				
<i>Fulica atra</i>	Eurasian Coot		+	
<i>Tribonyx ventralis</i>	Black-tailed Native-hen		+	
<b>Otididae</b>				
<i>Ardeotis australis</i>	Australian Bustard		+	
<b>CHARADRIIFORMES</b>				
<b>Burhinidae</b>				
<i>Burhinus grallarius</i>	Bush Stone-curlew		+	+
<b>Haematopodidae</b>				
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		+	
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher		+	
<b>Recurvirostridae</b>				
<i>Himantopus himantopus</i>	Black-winged Stilt		+	
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		+	
<b>Charadriidae</b>				
<i>Charadrius australis</i>	Inland Dotterel		+	

Species	Common Name	Conservation Status	CRNP	UCL
<i>Charadrius leschenaultii</i>	Greater Sand Plover	IA	+	
<i>Charadrius mongolus</i>	Lesser Sand Plover	IA	+	+
<i>Charadrius ruficapillus</i>	Red-capped Plover		+	
<i>Charadrius veredus</i>	Oriental Plover	IA	+	
<i>Pluvialis squatarola</i>	Grey Plover	IA	+	
<i>Vanellus tricolor</i>	Banded Lapwing		+	
<b>Scolopacidae</b>				
<i>Actitis hypoleucos</i>	Common Sandpiper		+	
<i>Arenaria interpres</i>	Ruddy Turnstone	IA	+	
<i>Calidris alba</i>	Sanderling	IA	+	
<i>Calidris canutus</i>	Red Knot	IA	+	
<i>Calidris ferruginea</i>	Curlew Sandpiper	IA	+	
<i>Calidris ruficollis</i>	Red-necked Stint	IA	+	
<i>Callidris tenuirostris</i>	Great Knot	IA	+	
<i>Limosa lapponica</i>	Bar-tailed Godwit	IA	+	
<i>Limosa limosa</i>	Black-tailed Godwit	IA	+	
<i>Numenius madagascariensis</i>	Eastern Curlew	IA	+	+
<i>Numenius minutus</i>	Little Curlew	IA	+	
<i>Numenius phaeopus</i>	Whimbrel	IA	+	
<i>Tringa brevipes</i>	Grey-tailed Tattler		+	
<i>Tringa glareola</i>	Wood Sandpiper	IA	+	
<i>Tringa nebularia</i>	Common Greenshank	IA	+	
<b>Turnicidae</b>				
<i>Turnix velox</i>	Little Button-quail		+	
<b>Laridae</b>				
<i>Anous stolidus</i>	Common Noddy	IA	+	

Species	Common Name	Conservation Status	CRNP	UCL
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		+	
<i>Gelochelidon nilotica</i>	Gull-billed Tern		+	
<i>Hydroprogne caspia</i>	Caspian Tern		+	
<i>Larus pacificus</i>	Pacific Gull		+	
<i>Onychoprion anaethetus</i>	Bridled Tern	IA	+	
<i>Onychoprion fuscata</i>	Sooty Tern		+	
<i>Sterna dougallii</i>	Roseate Tern	IA	+	
<i>Sterna hirundo</i>	Common Tern	IA	+	
<i>Sternula nereis</i>	Fairy Tern		+	
<i>Thalasseus bengalensis</i>	Lesser Crested Tern		+	
<i>Thalasseus bergii</i>	Crested Tern		+	
<b>PSITTACIFORMES</b>				
<b>Cacatuidae</b>				
<i>Cacatua sanguinea</i>	Little Corella		+	+
<i>Eolophus roseicapillus</i>	Galah		+	+
<i>Nymphicus hollandicus</i>	Cockatiel		+	
<b>Psittacidae</b>				
<i>Barnardius zonarius</i>	Australian Ringneck		+	+
<i>Melopsittacus undulatus</i>	Budgerigar		+	
<b>CUCULIFORMES</b>				
<b>Cuculidae</b>				
<i>Cacomantis pallidus</i>	Pallid Cuckoo		+	
<i>Chalcites basalis</i>	Horsfield's Bronze- Cuckoo		+	+
<i>Chalcites osculans</i>	Black-eared Cuckoo		+	

Species	Common Name	Conservation Status	CRNP	UCL
<b>STRIGIFORMES</b>				
<b>Strigidae</b>				
<i>Ninox novaeseelandiae</i>	Southern Boobook		+	
<b>Tytonidae</b>				
<i>Tyto alba</i>	Barn Owl		+	+
<b>CORACIIFORMES</b>				
<b>Halcyonidae</b>				
<i>Todiramphus chloris</i>	Collared Kingfisher		+	
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		+	
<i>Todiramphus sanctus</i>	Sacred Kingfisher		+	
<b>Meropidae</b>				
<i>Merops ornatus</i>	Rainbow Bee-eater		+	+
<b>PASSERIFORMES</b>				
<b>Climacteridae</b>				
<i>Ptilonorhynchus guttatus</i>	Western Bowerbird		+	+
<b>Maluridae</b>				
<i>Amytornis striatus</i>	Striated Grasswren		+	
<i>Calamanthus campestris</i>	Rufous Fieldwren			+
<i>Calamanthus fuliginosus</i>	Striated Fieldwren			
<i>Malurus lamberti</i>	Variegated Fairy-wren		+	
<i>Malurus leucopterus</i>	White-winged Fairy-wren		+	
<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren		+	

Species	Common Name	Conservation Status	CRNP	UCL
<b>Acanthizidae</b>				
<i>Pyrrholaemus brunneus</i>	Redthroat		+	
<b>Pardalotidae</b>				
<i>Pardalotus rubricatus</i>	Red-browed Pardalote			+
<b>Meliphagidae</b>				
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		+	+
<i>Certhionyx variegatus</i>	Pied Honeyeater		+	
<i>Conopophila whitei</i>	Grey Honeyeater			
<i>Epthianura aurifrons</i>	Orange Chat		+	
<i>Epthianura tricolor</i>	Crimson Chat		+	
<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater		+	+
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		+	
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater			
<i>Lichenostomus virescens</i>	Singing Honeyeater		+	+
<i>Lichmera indistincta</i>	Brown Honeyeater		+	+
<i>Manorina flavigula</i>	Yellow-throated Miner		+	+
<b>Eupetidae</b>				
<i>Psophodes occidentalis</i>	Chiming Wedgebill		+	
<b>Campephagidae</b>				
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike			+

Species	Common Name	Conservation Status	CRNP	UCL
<i>Lalage sueurii</i>	White-winged Triller		+	
<b>Pachycephalidae</b>				
<i>Colluricincla harmonica</i>	Grey Shrike-thrush			+
<i>Oreoica gutturalis</i>	Crested Bellbird		+	+
<i>Pachycephala lanioides</i>	White-breasted Whistler			
<i>Pachycephala melanura</i>	Mangrove Golden Whistler		+	
<i>Pachycephala rufiventris</i>	Rufous Whistler		+	
<b>Artamidae</b>				
<i>Artamus cinereus</i>	Black-faced Woodswallow		+	+
<i>Artamus leucorynchus</i>	White-breasted Woodswallow		+	
<i>Artamus minor</i>	Little Woodswallow		+	
<i>Artamus personatus</i>	Masked Woodswallow		+	
<i>Cracticus nigrogularis</i>	Pied Butcherbird		+	
<i>Cracticus torquatus</i>	Grey Butcherbird		+	+
<b>Rhipiduridae</b>				
<i>Rhipidura albiscapa</i>	Grey Fantail		+	+
<i>Rhipidura leucophrys</i>	Willie Wagtail		+	+
<i>Rhipidura phasiana</i>	Mangrove Grey Fantail			
<b>Corvidae</b>				
<i>Corvus bennetti</i>	Little Crow		+	
<i>Corvus orru</i>	Torresian Crow		+	+

Species	Common Name	Conservation Status	CRNP	UCL
<b>Monarchidae</b>				
<i>Grallina cyanoleuca</i>	Magpie-lark		+	+
<b>Megaluridae</b>				
<i>Cincloramphus cruralis</i>	Brown Songlark		+	+
<i>Eremiornis carteri</i>	Spinifexbird		+	+
<b>Hirundinidae</b>				
<i>Cheramoeca leucosterna</i>	White-backed Swallow		+	
<b>Nectariniidae</b>				
<i>Dicaeum hirundinaceum</i>	Mistletoebird		+	+
<b>Estrildidae</b>				
<i>Emblema pictum</i>	Painted Finch		+	
<i>Neochmia ruficauda</i>	Star Finch		+	
<i>Taeniopygia guttata</i>	Zebra Finch		+	+
<b>Motacillidae</b>				
<i>Anthus novaeseelandiae</i>	Australasian Pipit		+	+
<b>Pomatostomidae</b>				
<i>Pomatostomus superciliosus</i>	White-browed Babbler		+	
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		+	

## APPENDIX 8 - STYGO- AND TROGLO- FAUNA

Styofauna and troglofauna recorded from the Cape Range peninsula \*facultative troglophile

Species	Common Name	Conservation Status	CRNP	UCL
<b>Atyidae</b>				
<i>Stygiocaris lancifera</i>	Lance-beaked Cave Shrimp	T	+	+
<i>Stygiocaris stylifera</i>	Spear-beaked Cave Shrimp	P4	+	+
<b>Chthoniidae</b>				
<i>Tyrannochthonius brooksii</i> *			+	+
<b>Eleotridae</b>				
<i>Milyeringa veritas</i>	Blind Gudgeon	T	+	+
<b>Hubbardiidae</b>				
<i>Bamazomus vespertinus</i>	Western Cape Range Bamazomus	T	+	
<i>Draculoides brooksi</i>	Northern Cape Range Draculoides	T		+
<i>Draculoides julianneae</i>	Western Cape Range Draculoides	T	+	
<b>Nocticolidae</b>				
<i>Nocticola flabella</i>	Cape Range Blind Cockroach	P2	+	
<b>Paradoxosomatidae</b>				
<i>Stygiochiropis communis</i>		T	+	+
<i>Stygiochiropus sympatricus</i>		T	+	+
<b>Synbranchidae</b>				

*Ophisternon candidum*

Blind Cave Eel

T

+

+

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## APPENDIX 9 - DEFINITIONS OF THE CONSERVATION CODES FOR WESTERN AUSTRALIAN FLORA AND FAUNA.

Code	Description	Notes
T	Rare or likely to become extinct	Rare flora have been customarily coded as "R", while fauna have been coded as "T". In the future DEC will be coding all rare taxa with a "T".
X	Presumed extinct	
IA	Protected under international agreement	
S	Other specially protected fauna	
1	Priority 1	Taxa with few, poorly known populations on threatened lands
2	Priority 2	Taxa with few, poorly known populations on conservation lands
3	Priority 3	Taxa with several, poorly known populations, some on conservation lands
4	Priority 4	Taxa in need of monitoring
5	Priority 5	Taxa in need of monitoring (conservation dependent)